

Welcome to this presentation.

It shows the different types of Process diagrams and will help you to read them.

It also provides you with reference information as to their contents.

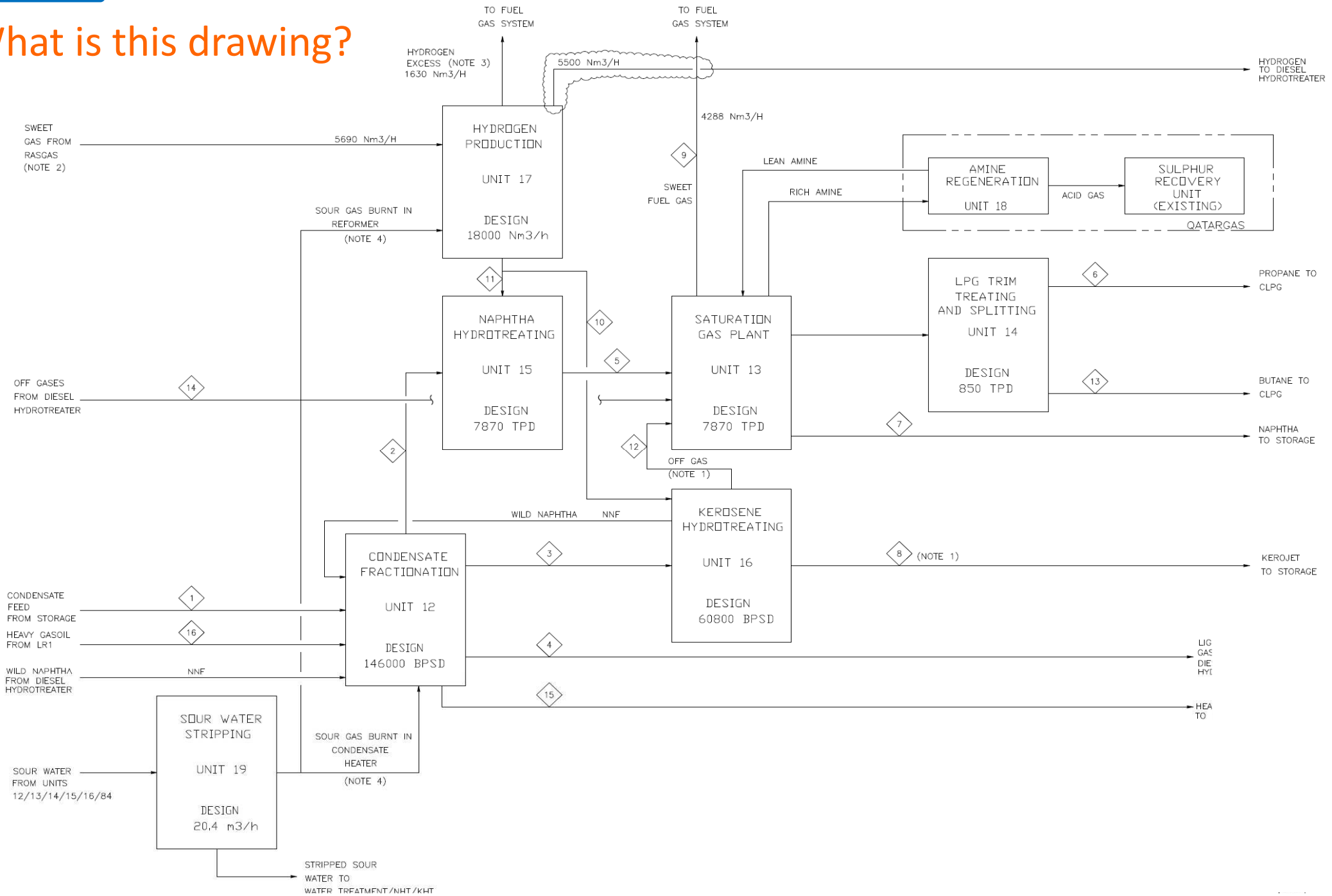
Comments are most welcome (herve.baron@gmail.com), which I will incorporate for the benefit of all.

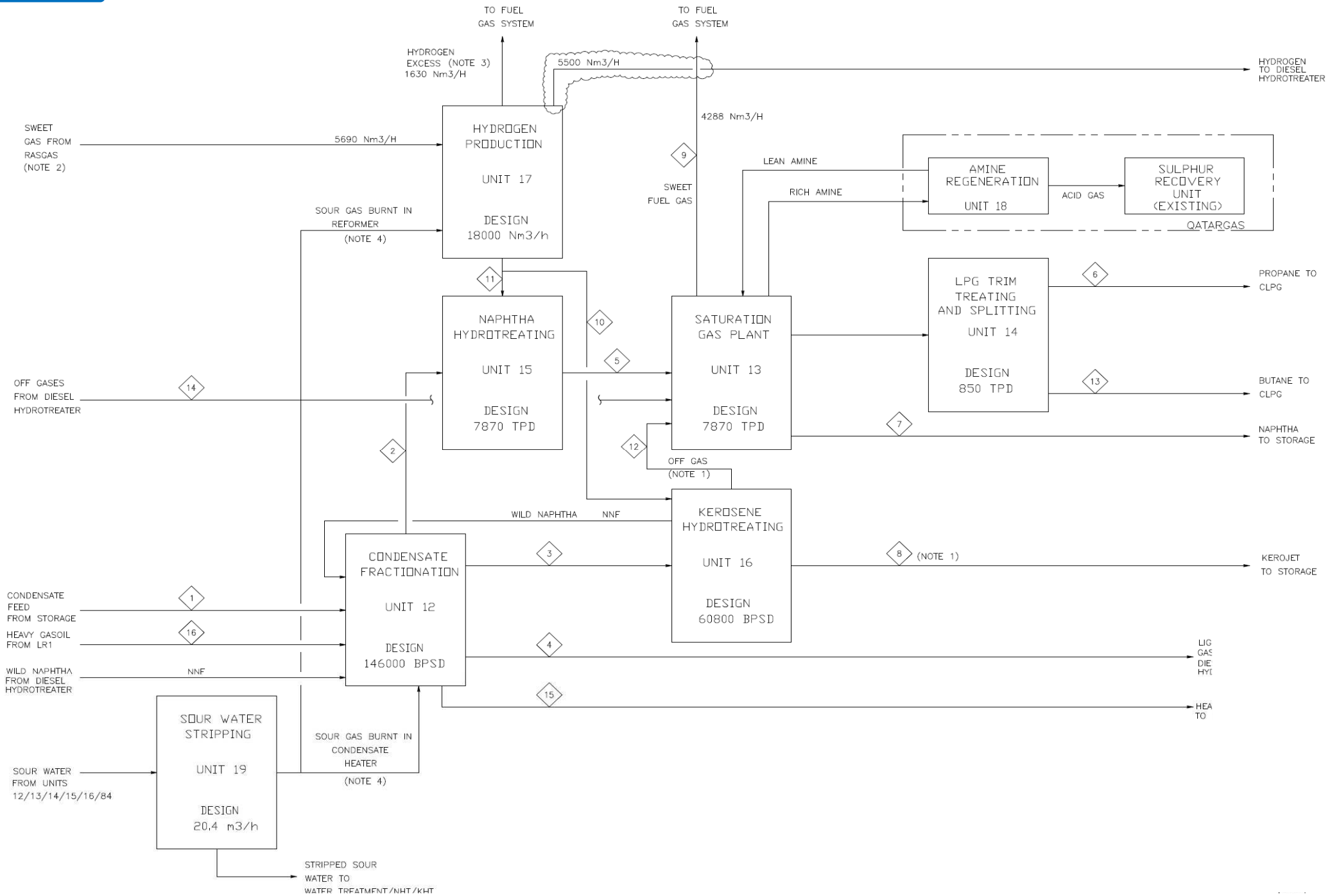
Hervé

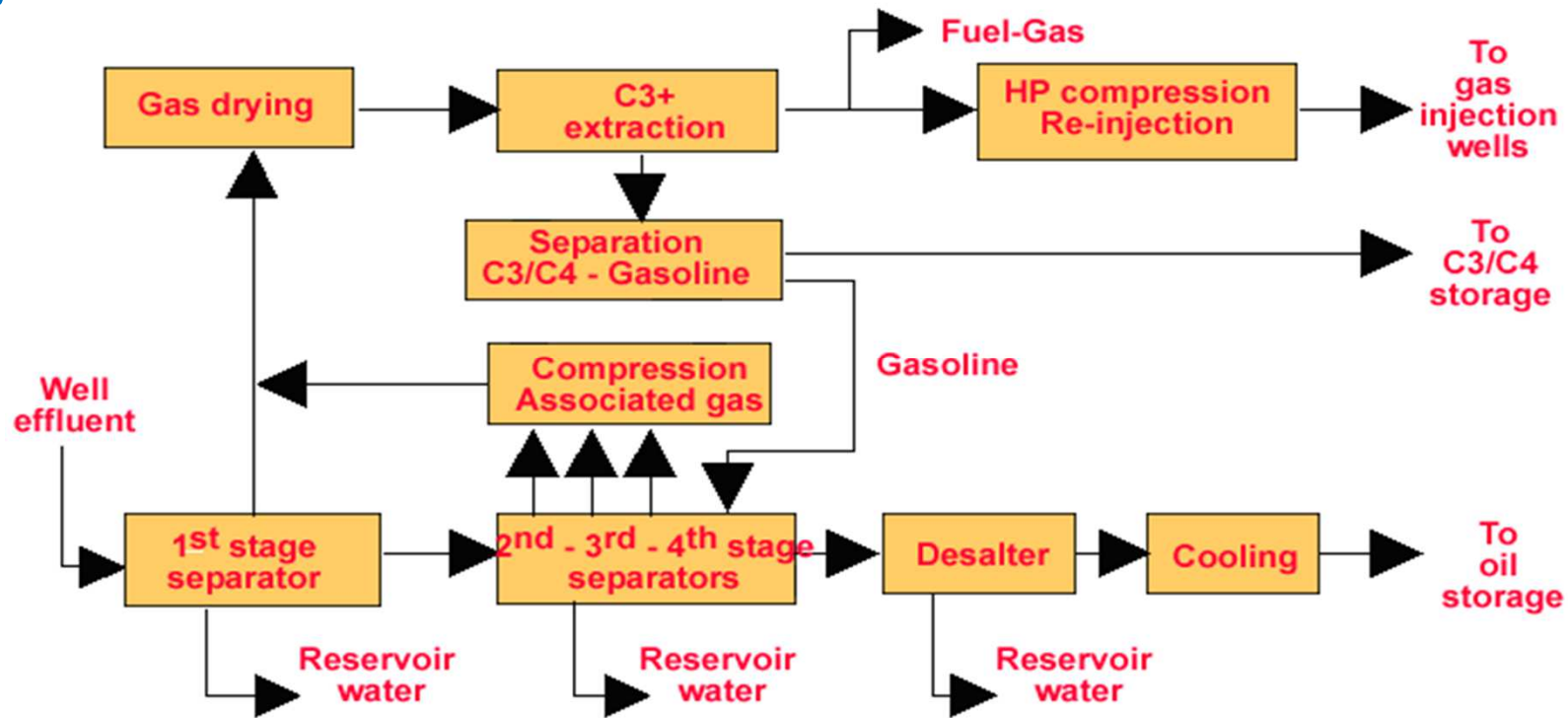
■ The Process Diagrams

- The Block Flow Diagram (BFD)
- The Process Flow Diagram (PFD)
- The Piping & Instrumentation Diagram (P&ID)
 - The various types of P&IDs
 - The different revisions of the P&IDs
- Other Process diagrams
- Quiz

What is this drawing?

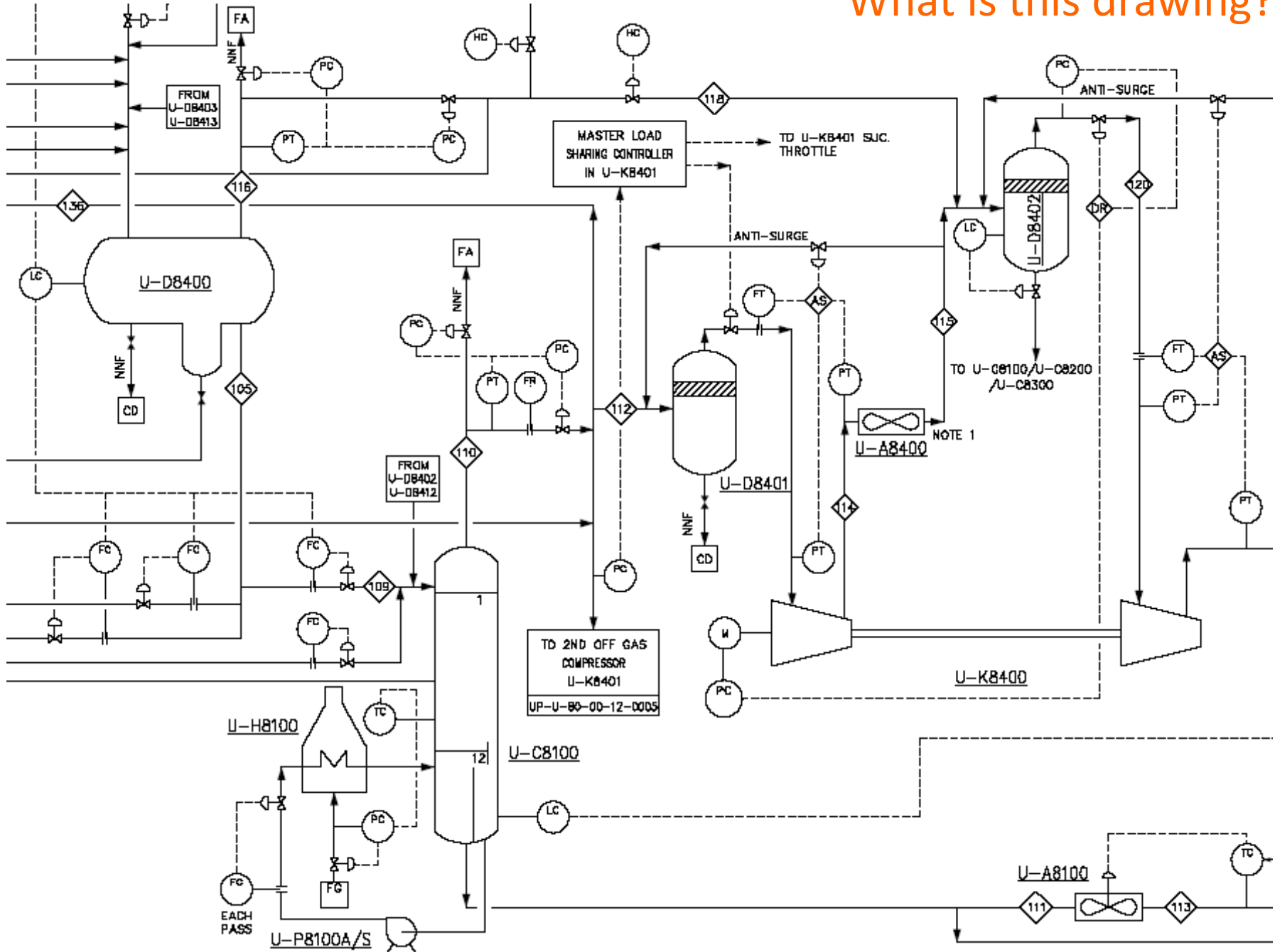


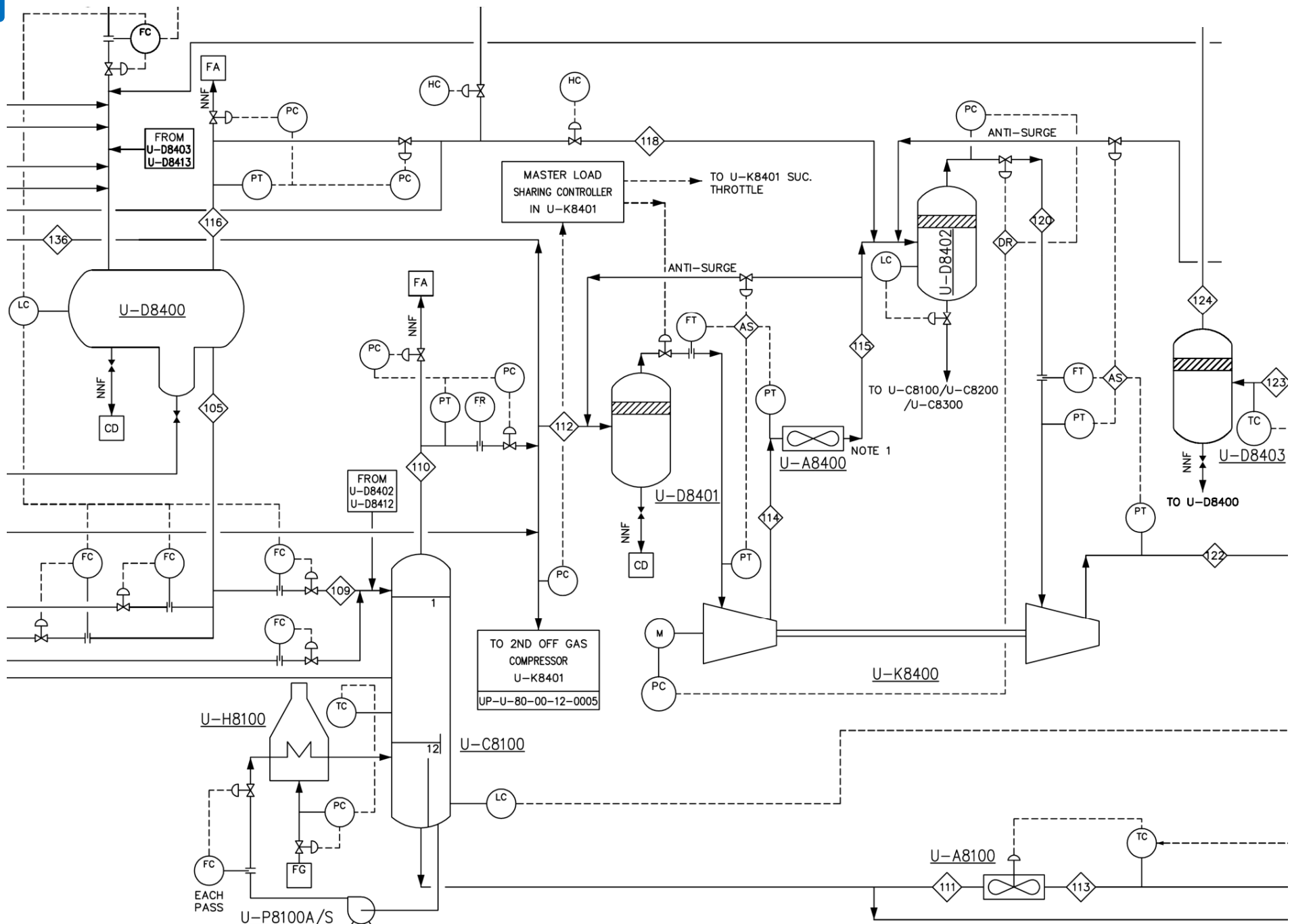


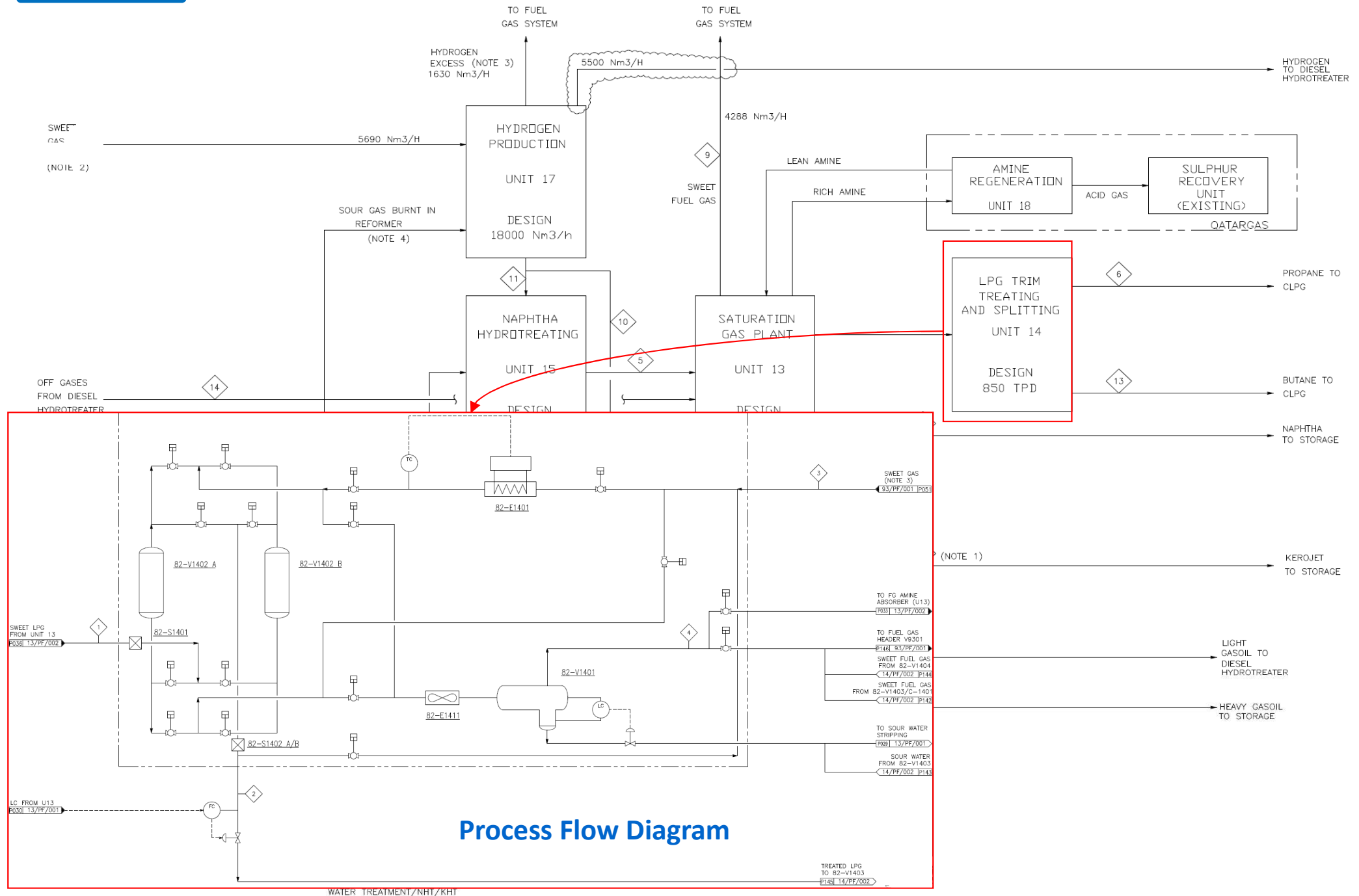


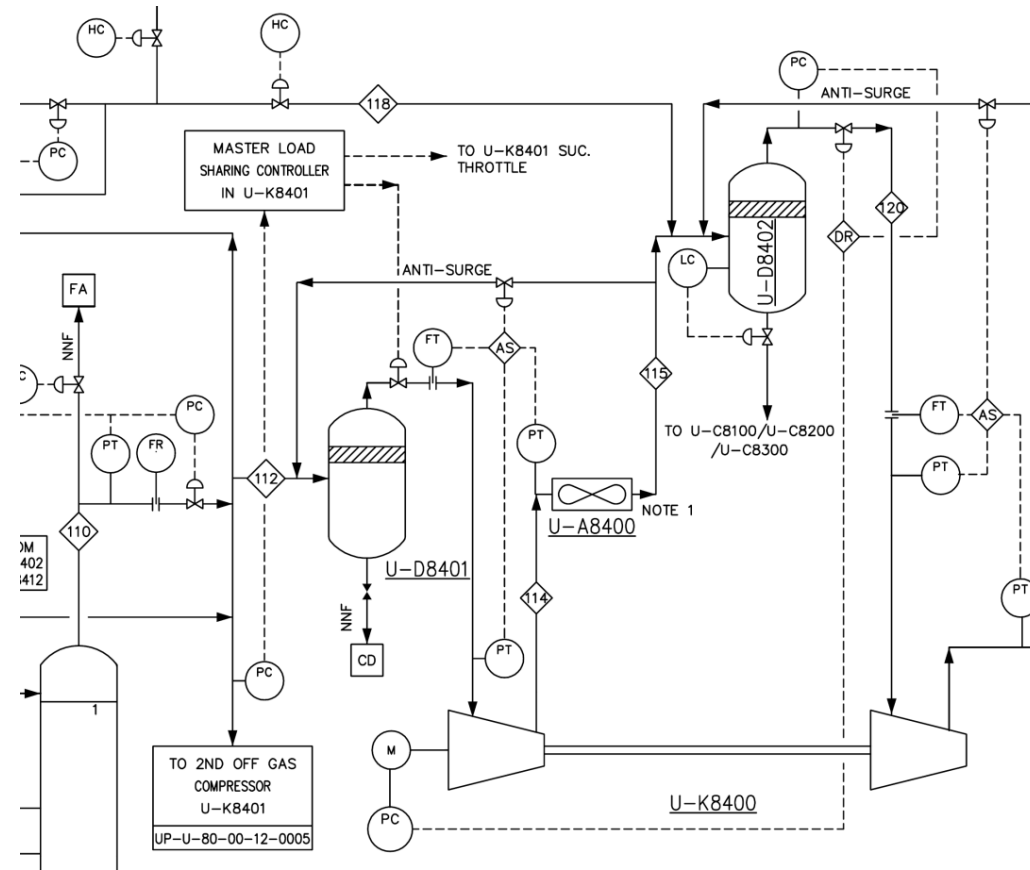
- Results from the high level functional requirements of the plant
- Depicts the various Processes carried out within the facility and their sequence
- Shows the inputs (feed) and outputs (products)
- The item of the BFD is the *Process Unit*

What is this drawing?





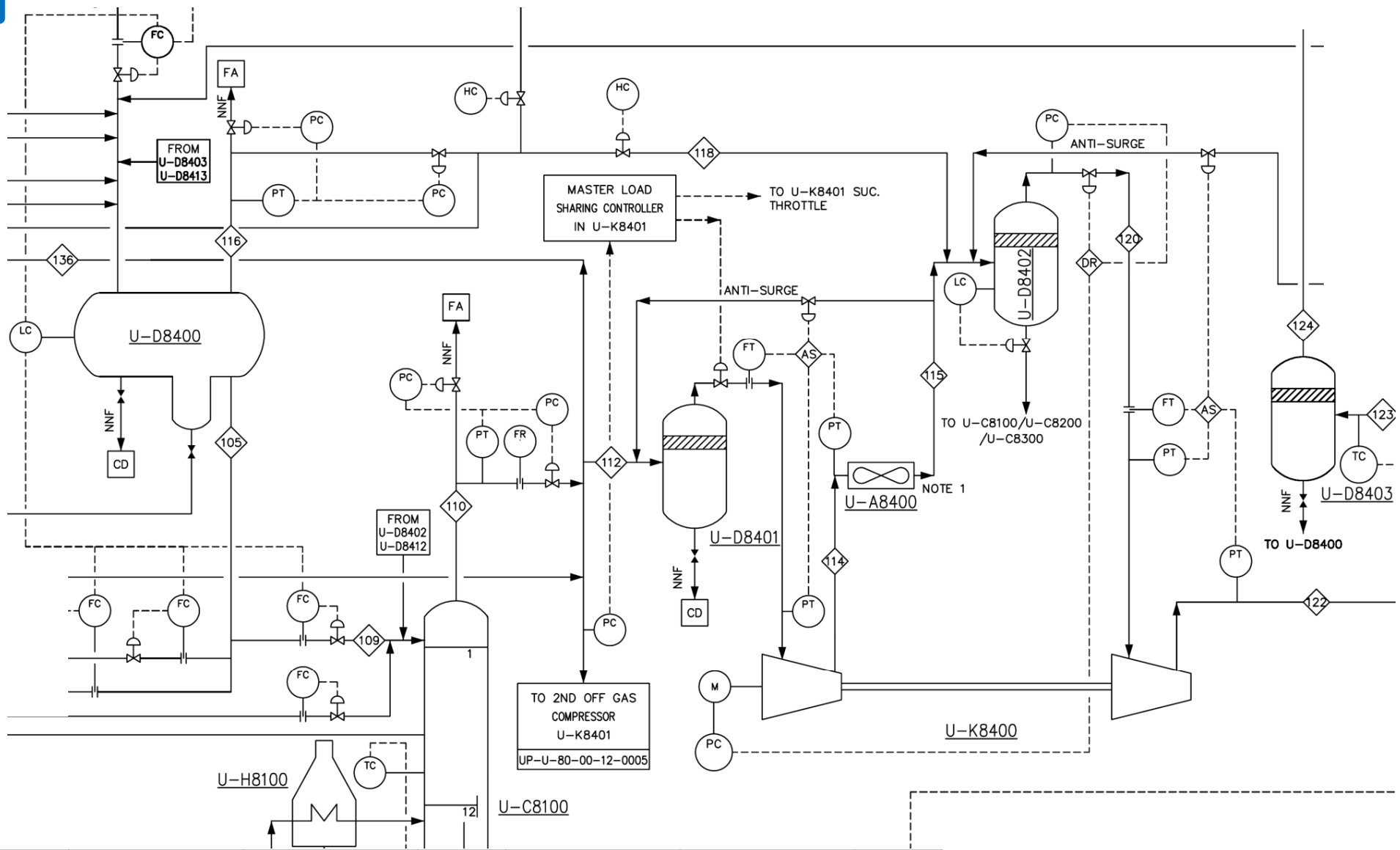




- Results from process simulations
- Depicts the various Equipment within a Process (or Utility) Unit and their sequence
- Shows the process controls
- The individual drawing item of the PFD is the *Equipment Item*

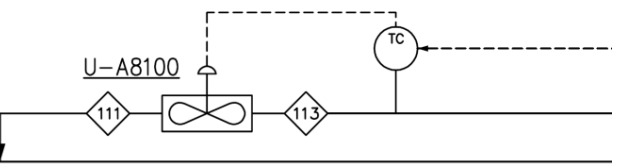
Scheme that includes the following information, as a minimum:

- Main equipment (all the itemized ones),
- Process lines between equipment,
- All control loops and main instruments,
- For each stream, indication of:
 - Temperature
 - Pressure
 - Composition
 - Specific gravity
 - Operating density
 - Heat content
 - Flow rate (relevant to each phase)
- Design conditions of main equipment.
- It shall be drawn-up according to ISA 6.12 regulation as far as symbology is concerning

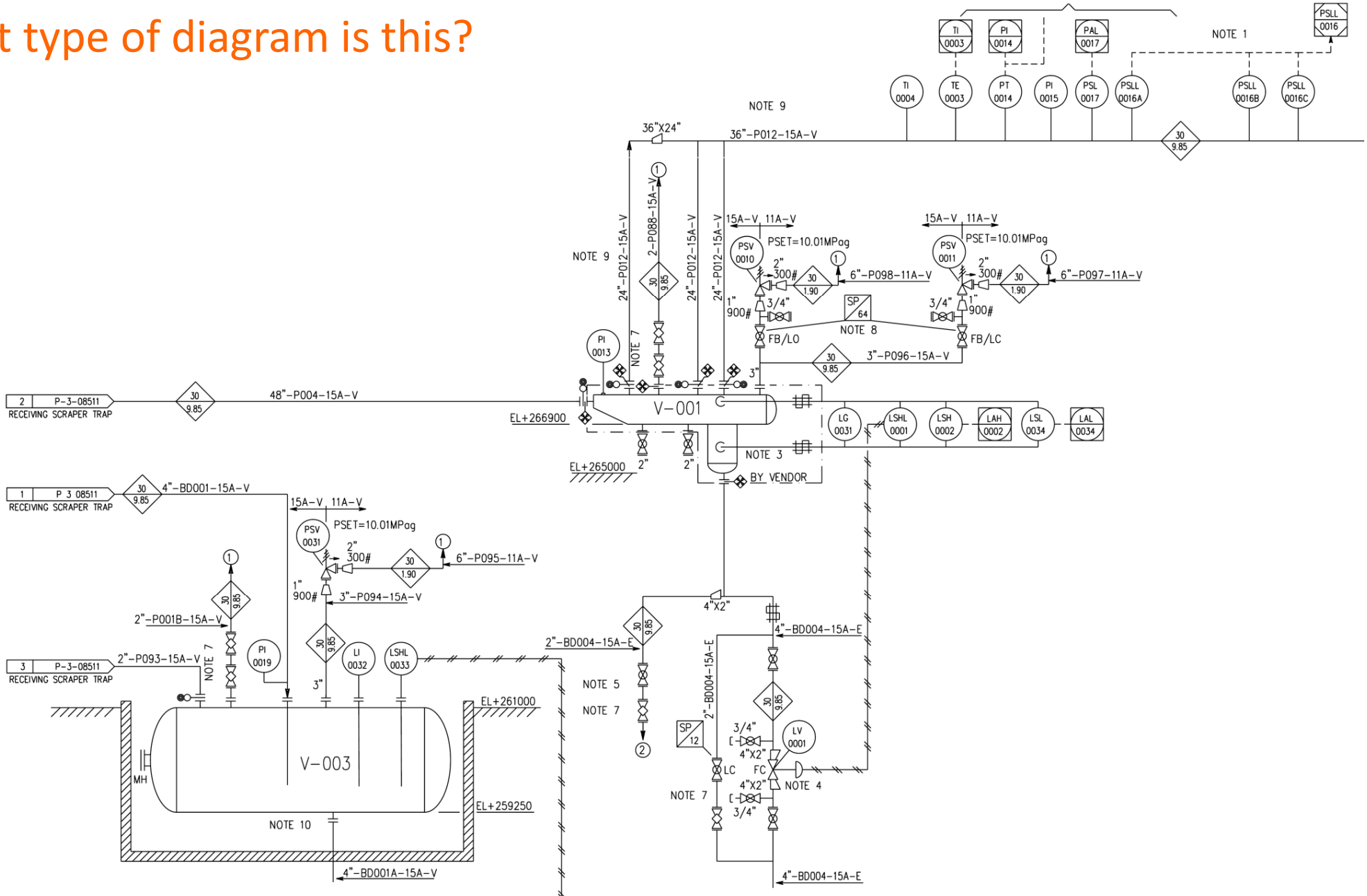


Heat and material balance

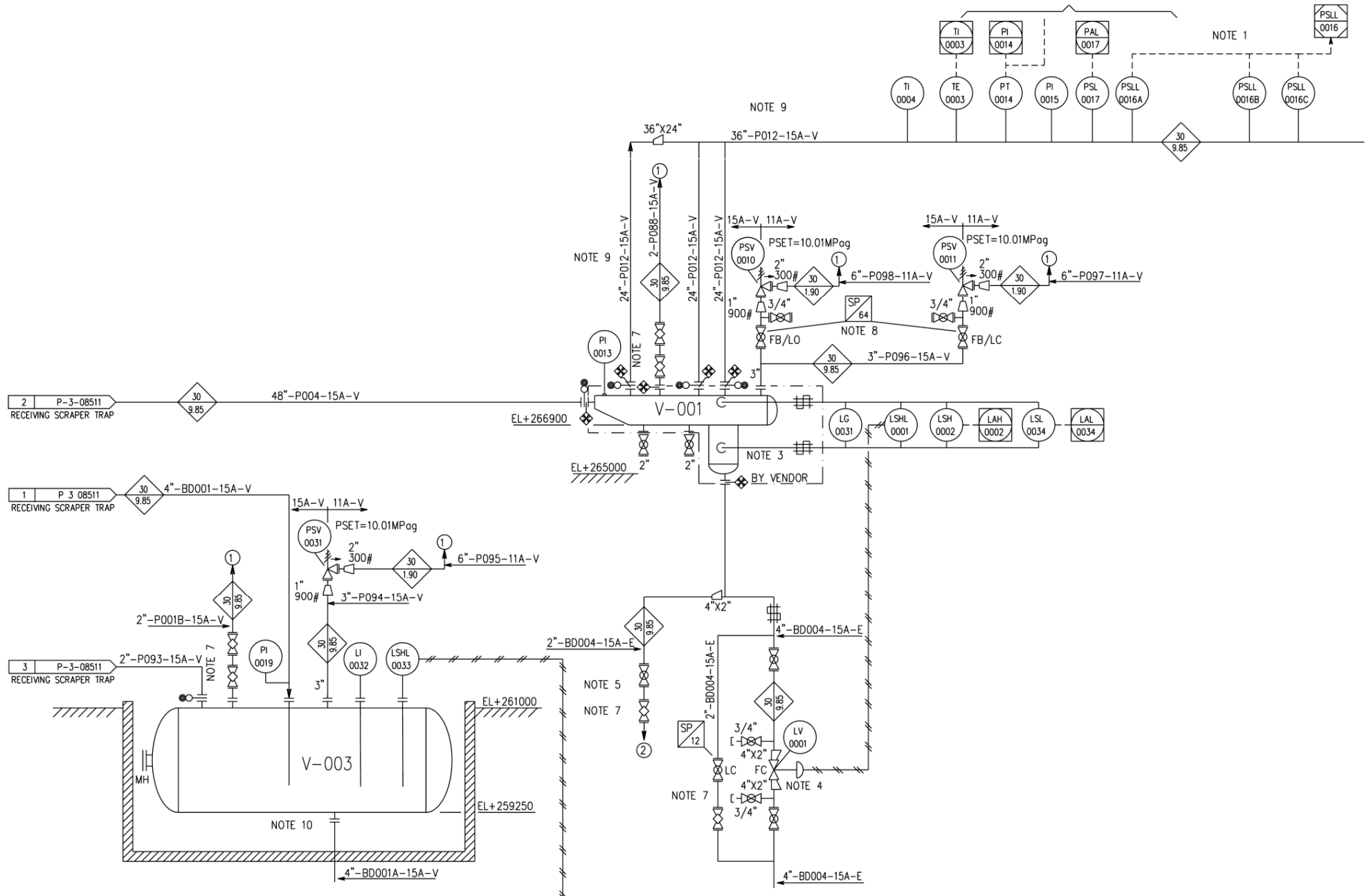
STREAMS		101		102		103		105		108		109		110
V/L STATE		Vapour	Liquid	Vapour	Liquid	Vapour	Liquid	Liquid	Vapour	Liquid	Vapour	Liquid	Vapour	Vapour
TEMPERATURE	°C	17.0	17.0	17.0	17.0	11.5	16.6	16.6	7.9	7.9	23.9			
PRESSURE	bar.a	80.00	80.00	80.00	80.00	28.00	77.86	77.86	10.00	10.00	10.00			
FLOW RATE	kg/h	1,646,285	271,793	1,646,285	271,793	251,790	563,514	15	2,761	81,169	8,080			
FLOW RATE	MMSCFD	1,680	-	1,680	-	-	572	-	2	-	5			
DENSITY(ACTUAL)	kg/m³	79.0	652.9	79.0	652.9	701.3	77.5	646.2	10.6	717.5	12.9			
MOLECULAR WT.	kg/kgmole	19.68	72.10	19.68	72.10	90.06	19.78	69.59	23.68	99.56	29.86			
VISCOSITY	cP	0.014	0.349	0.014	0.349	0.507	0.014	0.323	0.011	0.622	0.011			



What type of diagram is this?



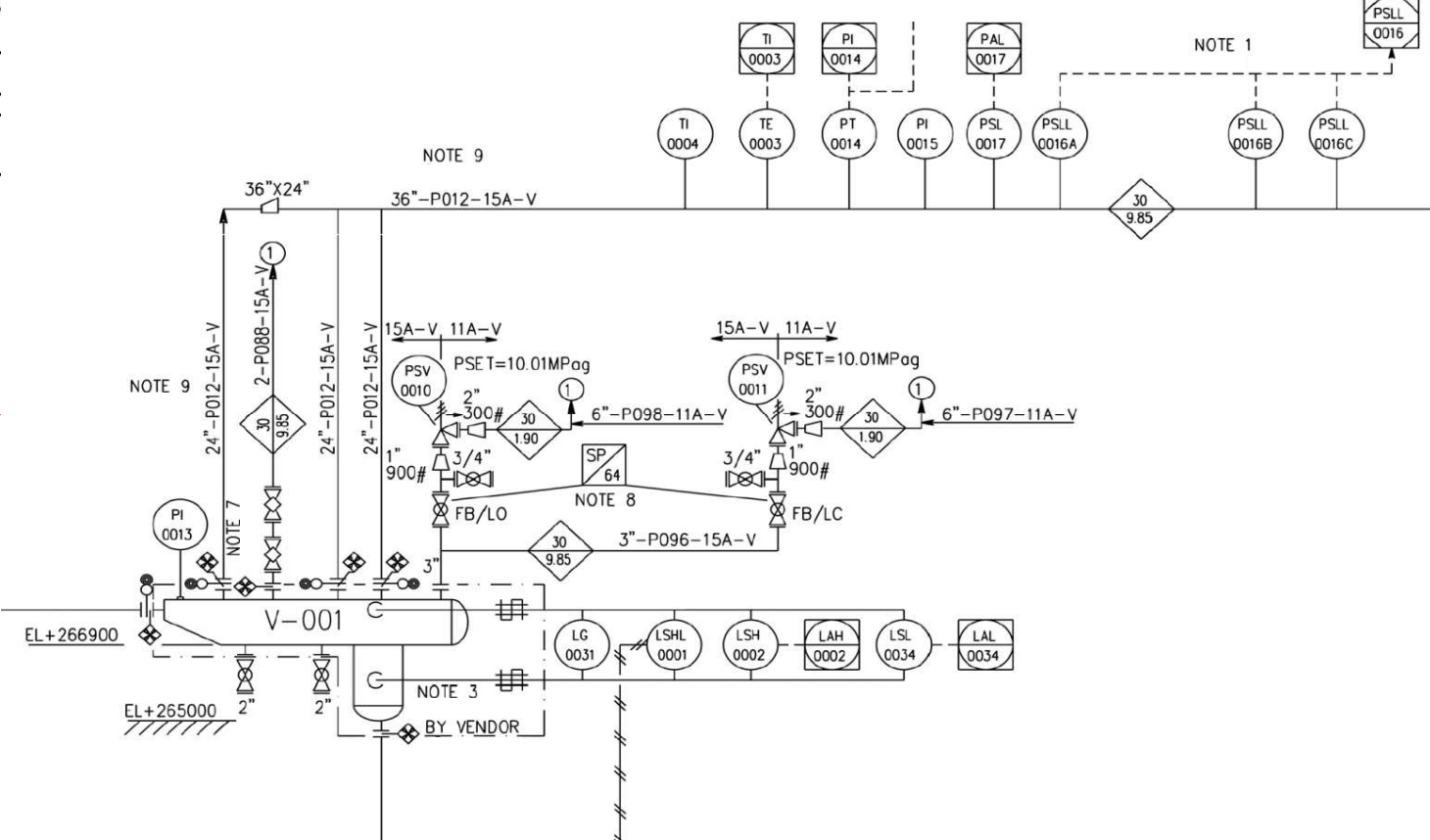
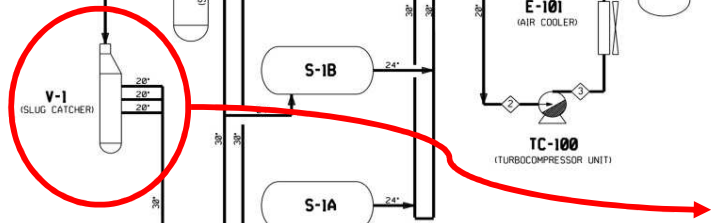
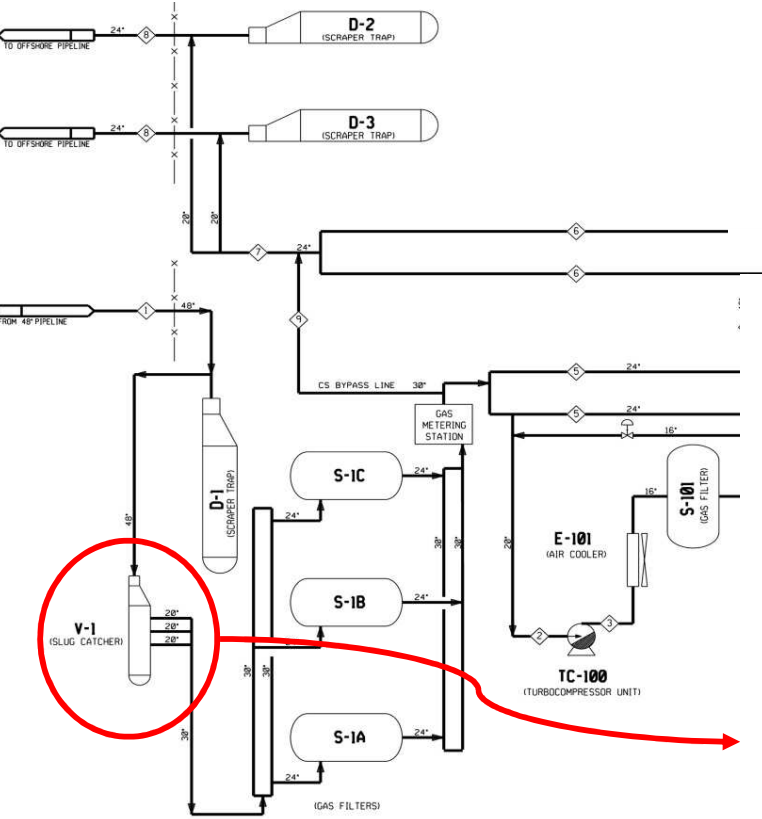
The Piping & Instrumentation Diagram (P&ID)



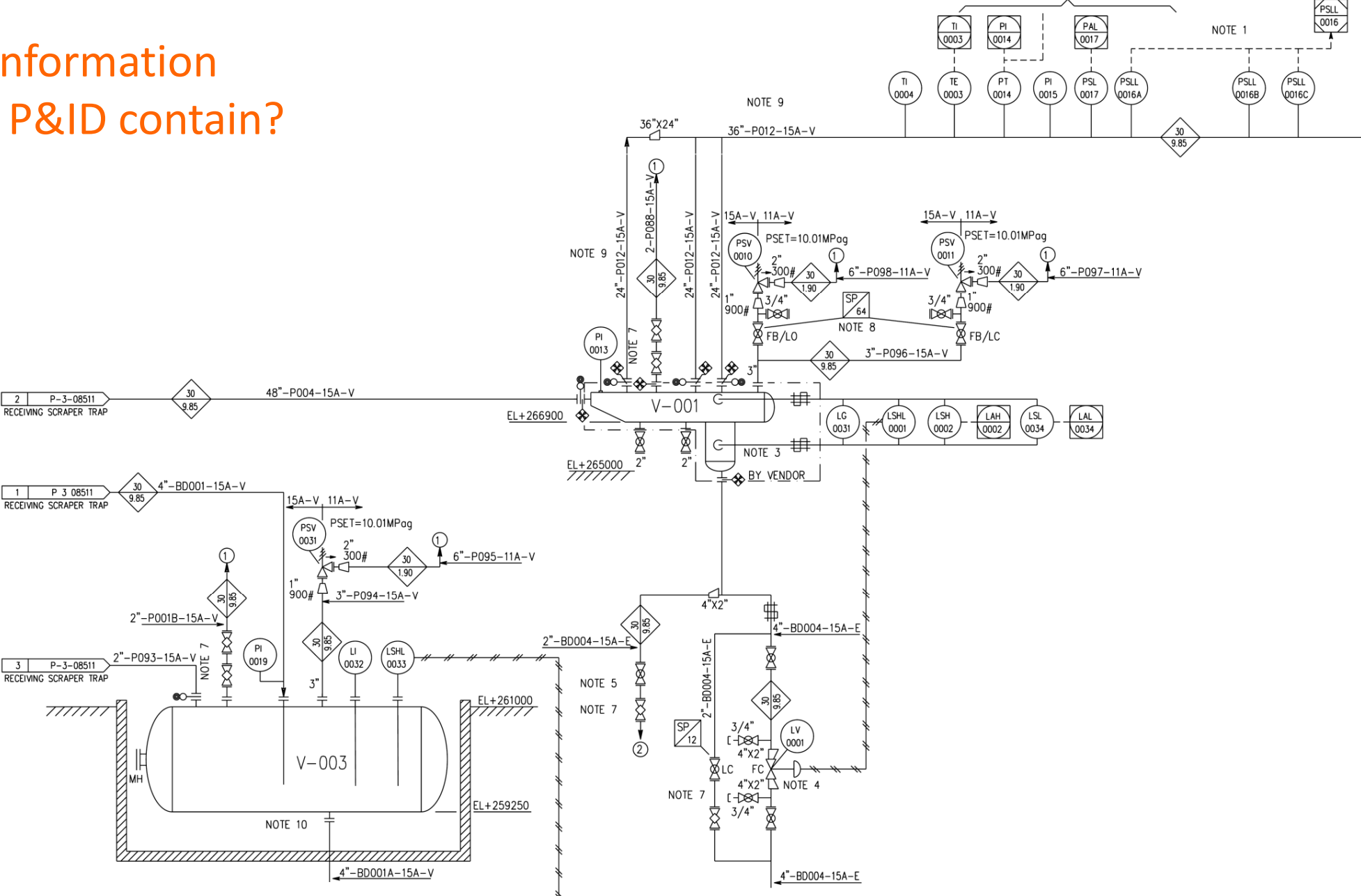
“a document that clearly identifies the equipment in the physico-chemical process and the circulation of fluids between these equipment items. It also shows the piping systems and control devices necessary for unit operation as well as the specific requirements to be taken into account for the design of systems.”

The PFD is a detailing of the PFD that show all lines, instruments necessary for the operation, monitoring, control and maintenance around individual equipment.

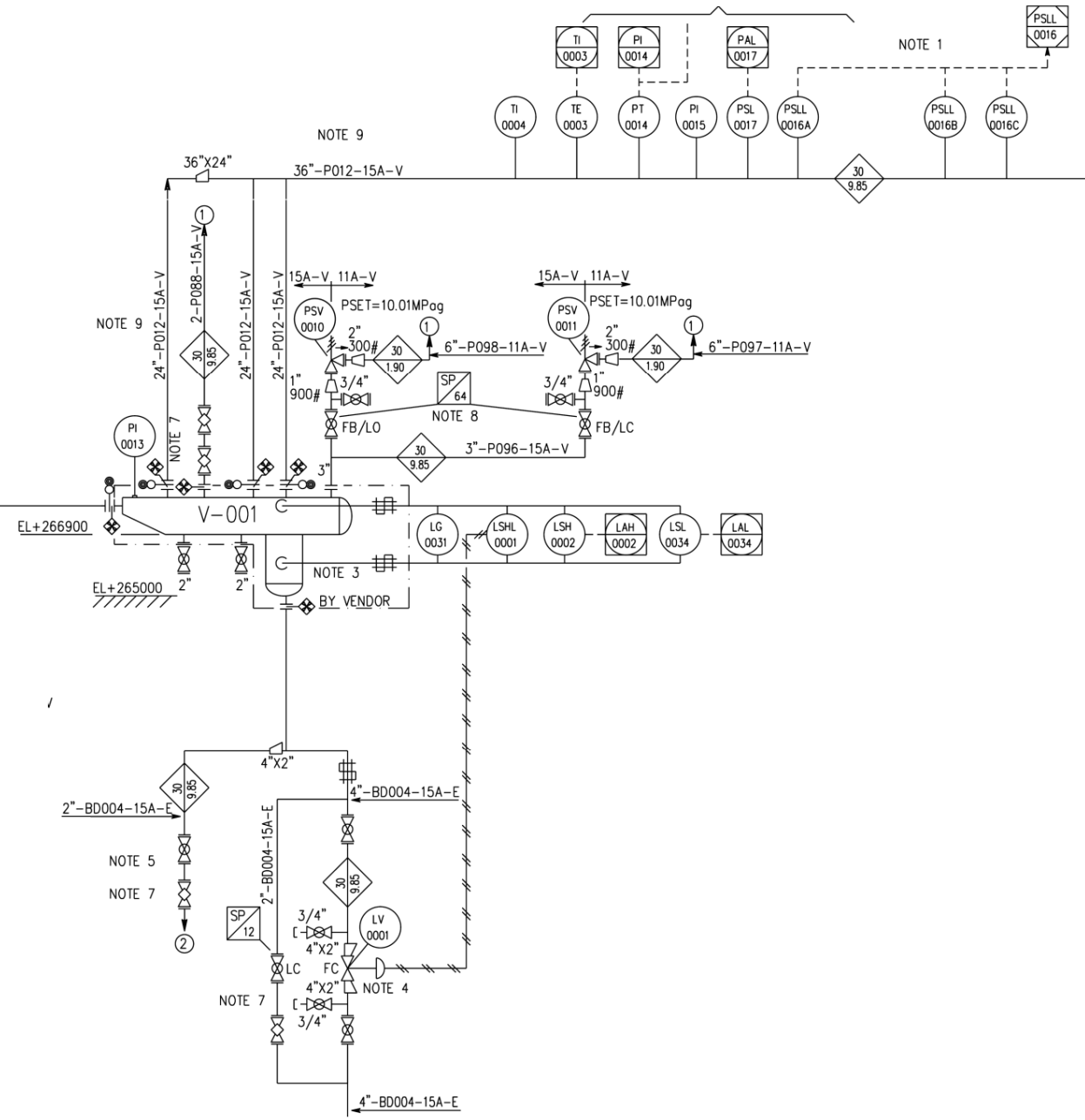
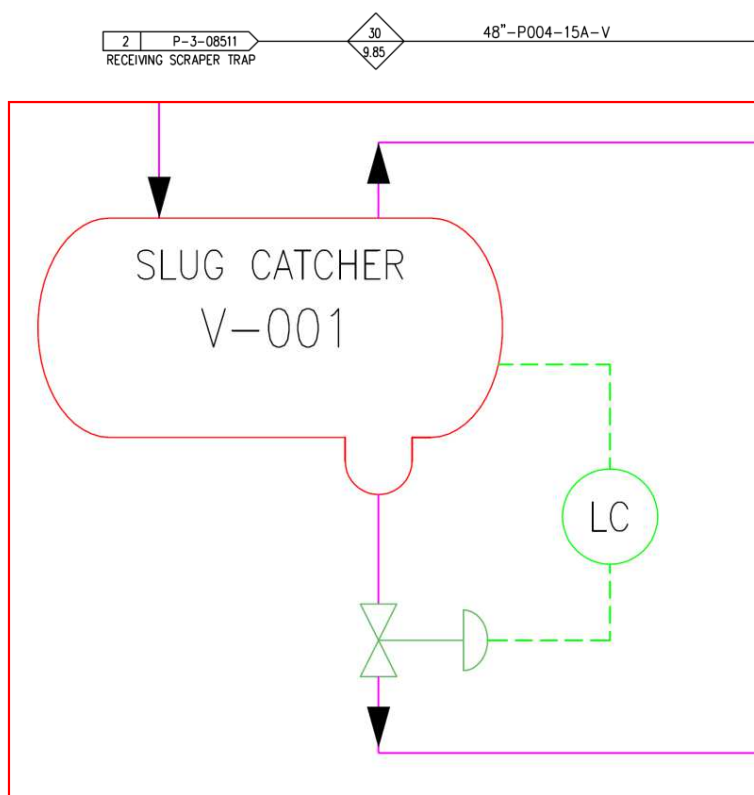
Piping & Instrumentation Diagram (P&ID)



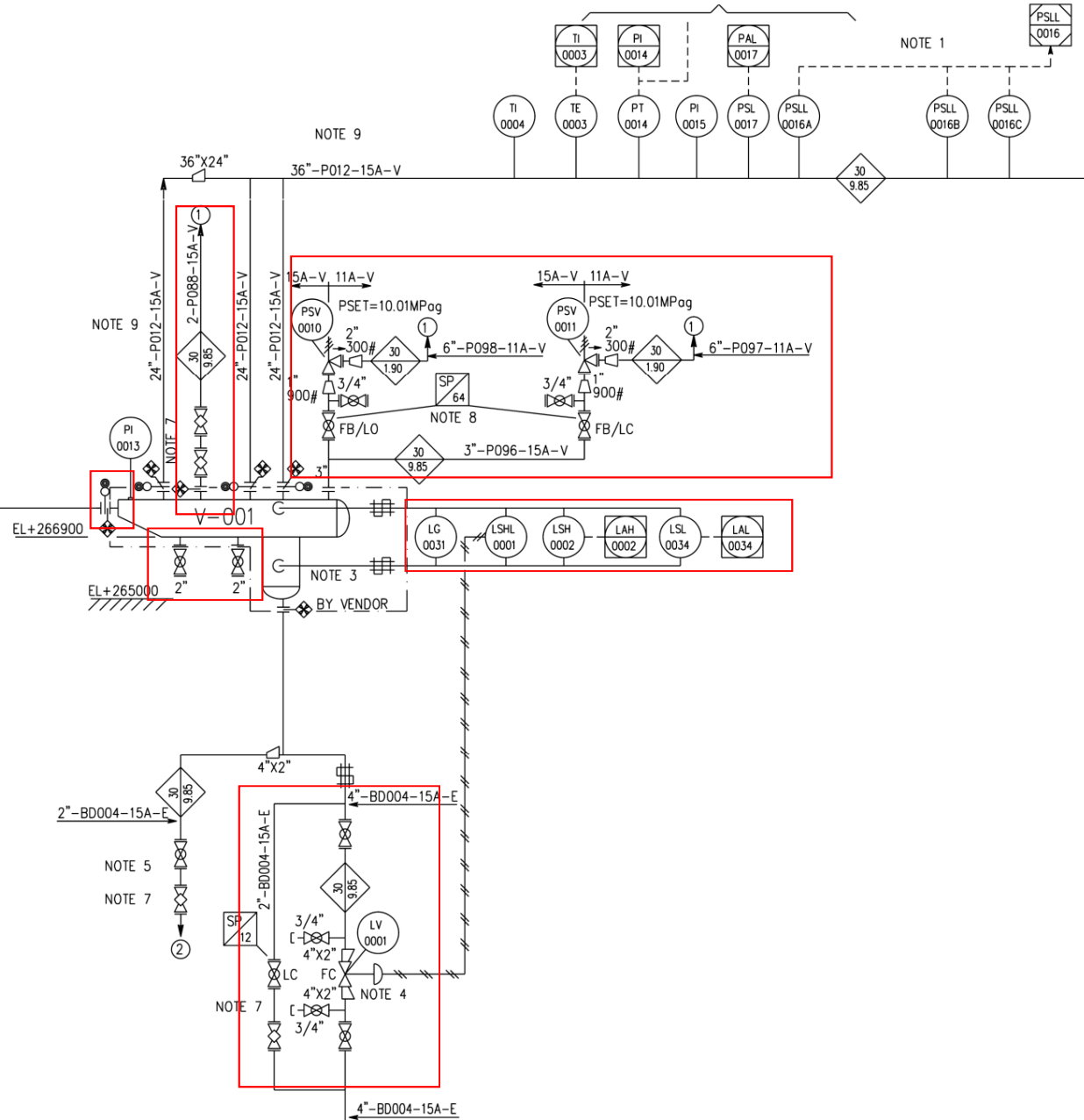
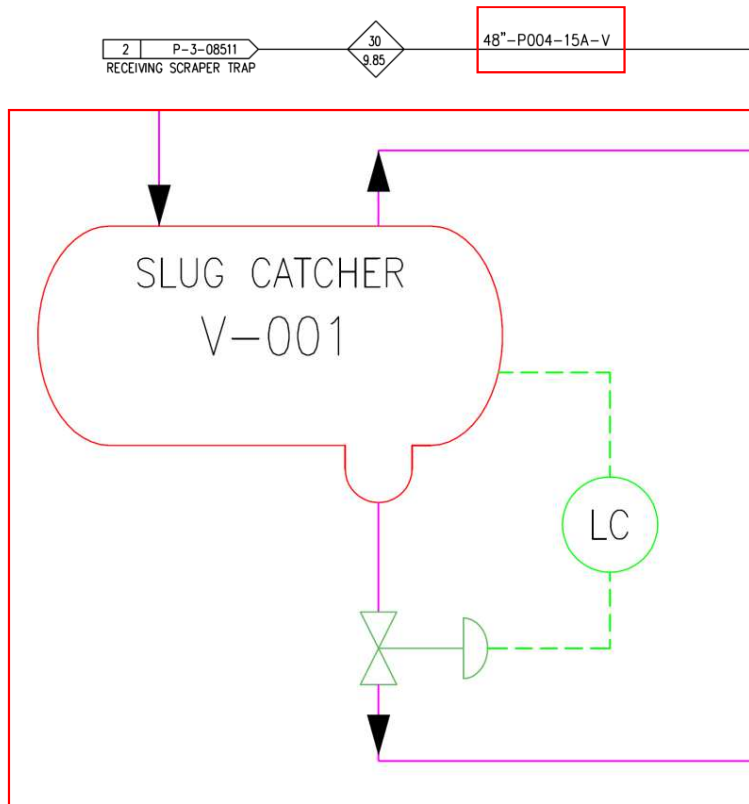
What information does a P&ID contain?



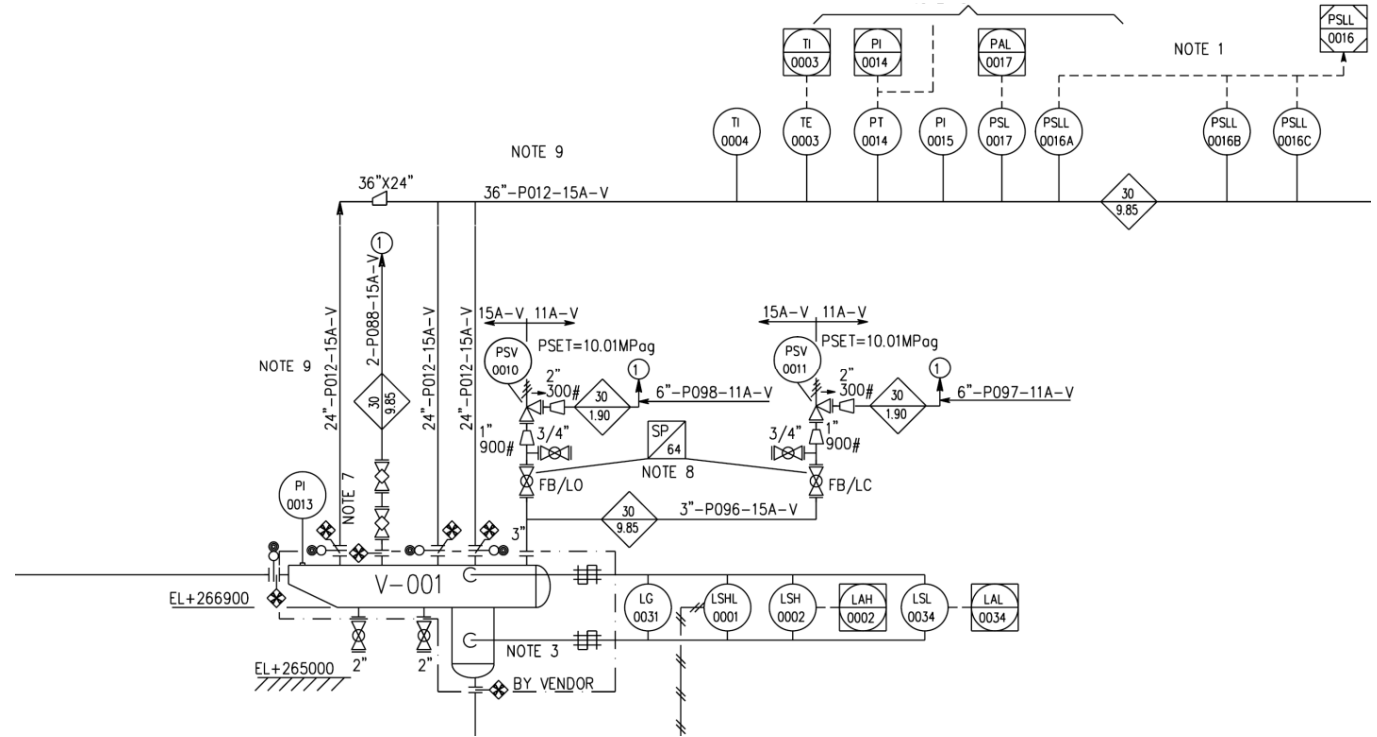
Compare the information shown on the PFD and the P&ID



Compare the information shown on the PFD and the P&ID

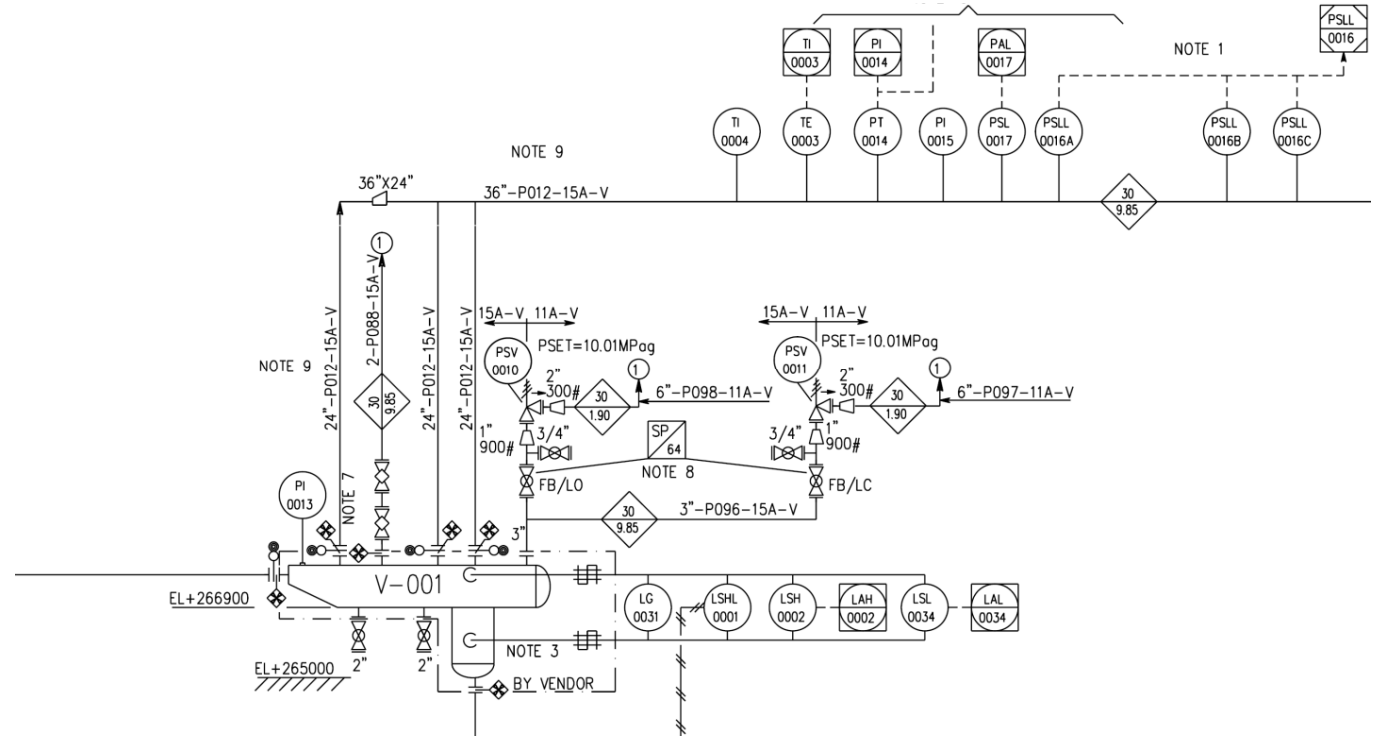


What purpose does a P&ID serve?



At design stage:

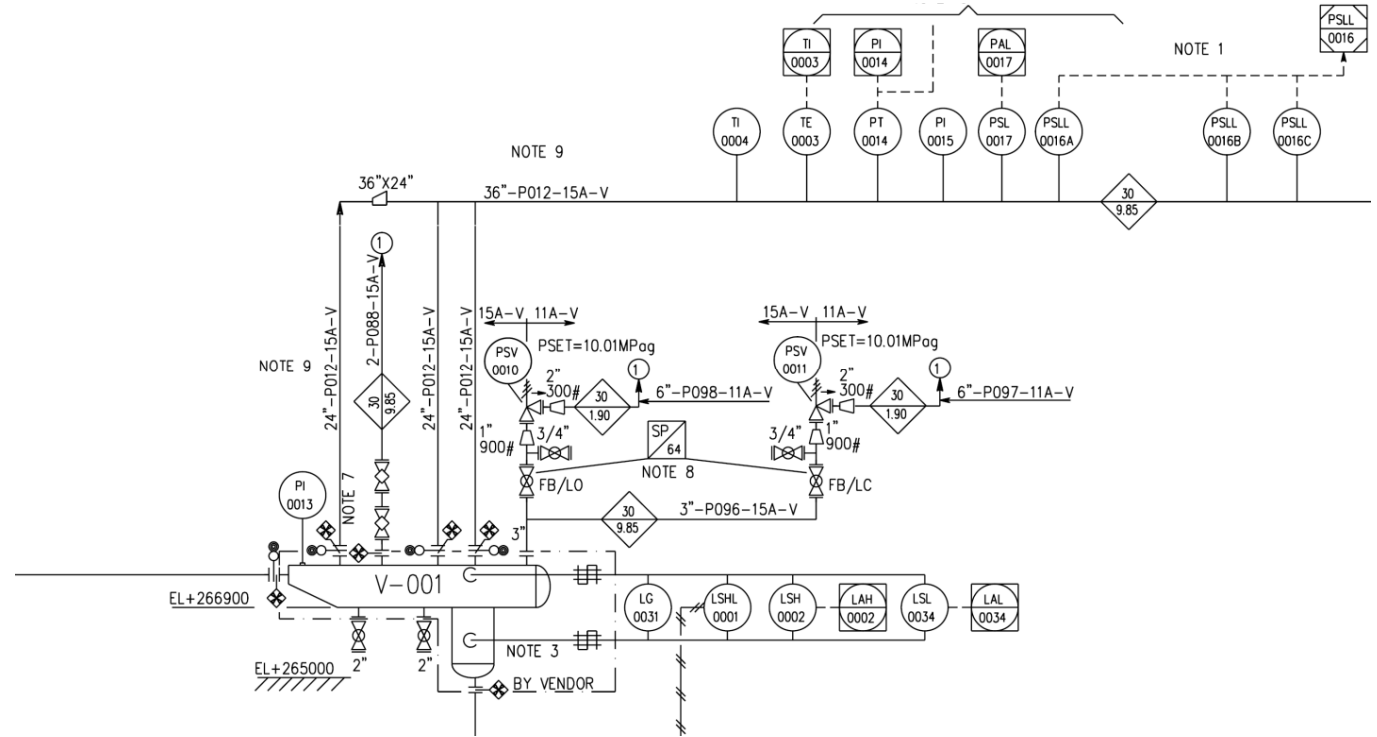
What purpose does a P&ID serve?



At design stage:

- Defines the design basis for Piping & Instrumentation disciplines

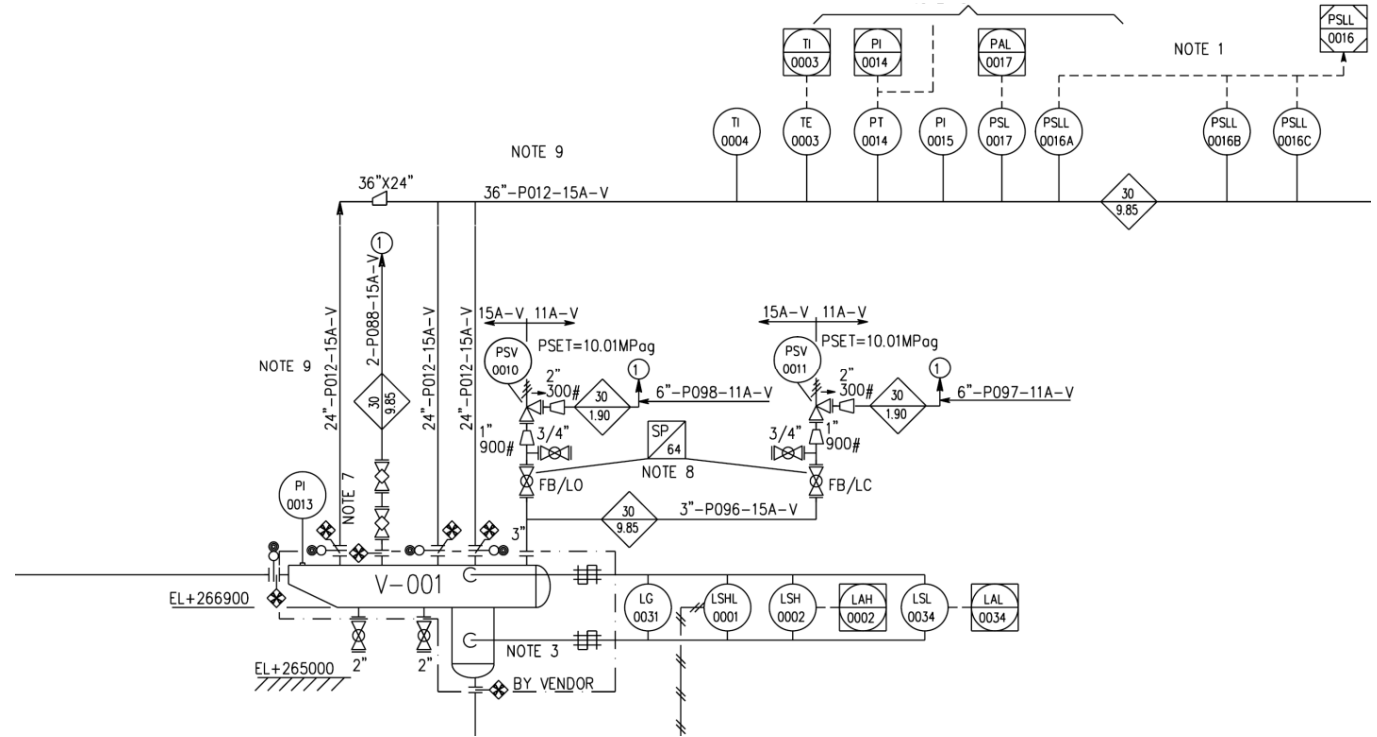
What purpose does a P&ID serve?



At design stage:

- Defines the design basis for Piping & Instrumentation disciplines
- Serves to show and agree the operating and maintenance features between Engineer and Owner or between Engineer and Vendor

What purpose does a P&ID serve?

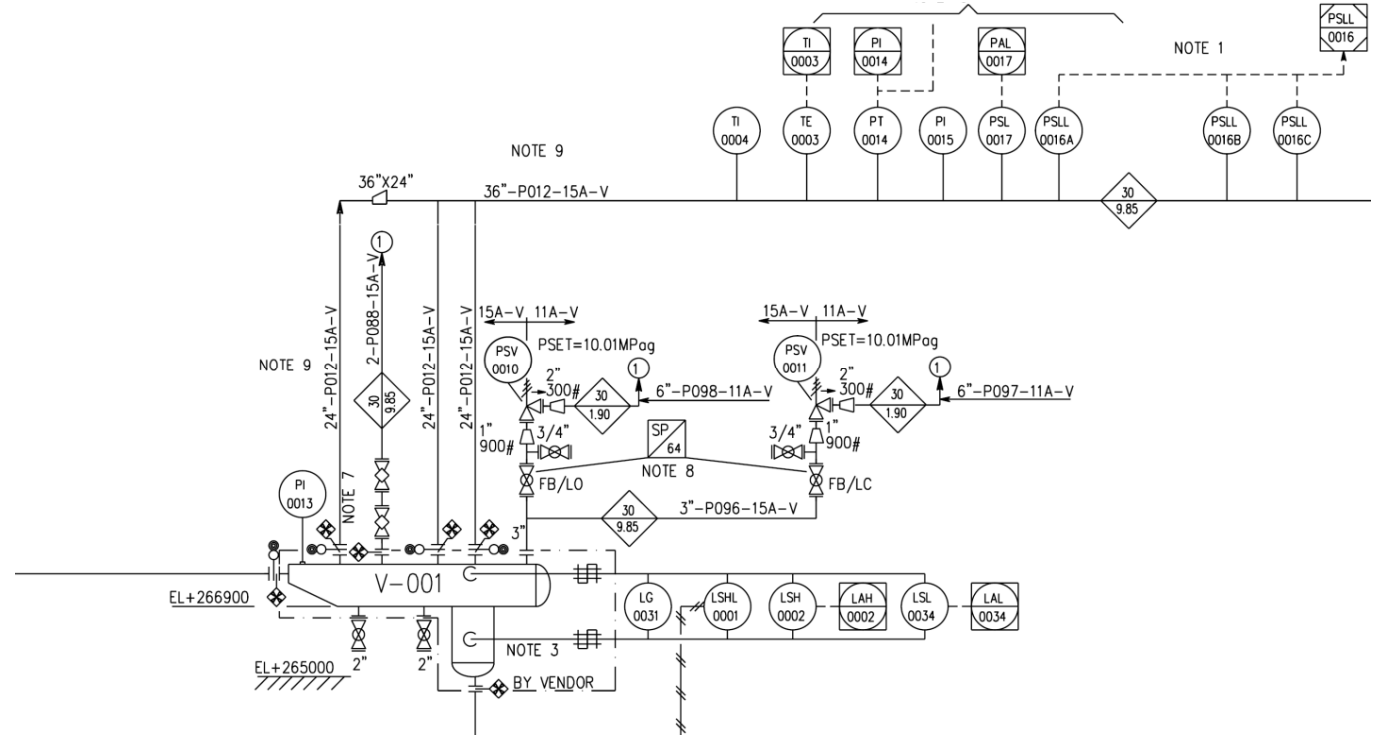


At design stage:

- Defines the design basis for Piping & Instrumentation disciplines
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At the P&ID review

What purpose does a P&ID serve?



At design stage:

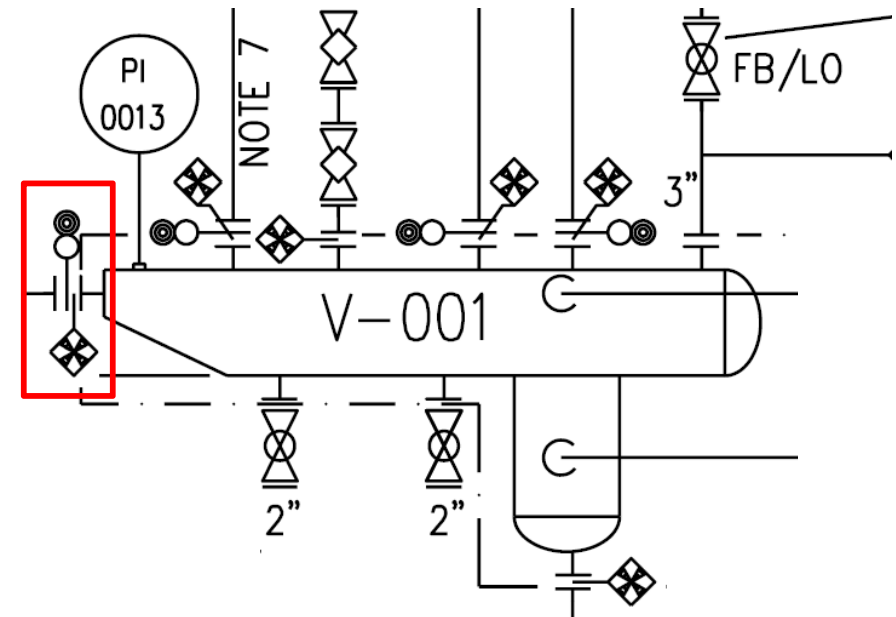
- Defines the design basis for Piping & Instrumentation disciplines
- Serves to show and agree the operating and maintenance features between Engineer and Owner or between Engineer and Vendor

At the P&ID review

What are the main items that are discussed during the P&ID review?

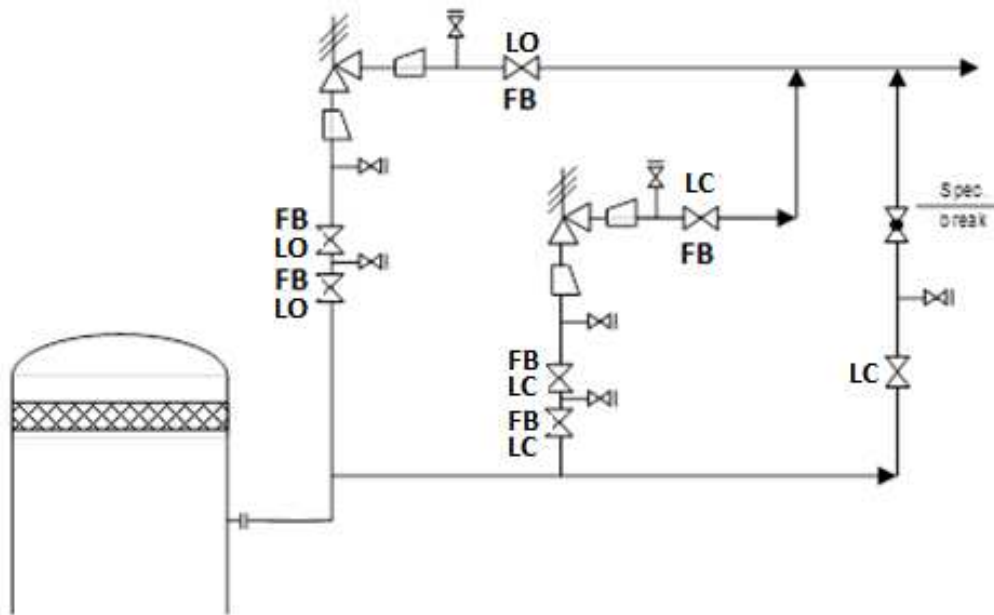
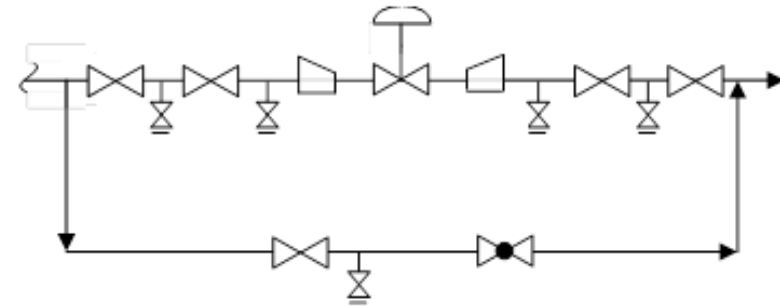
Ease of operation and maintenance:

- Isolation /bypass of equipment



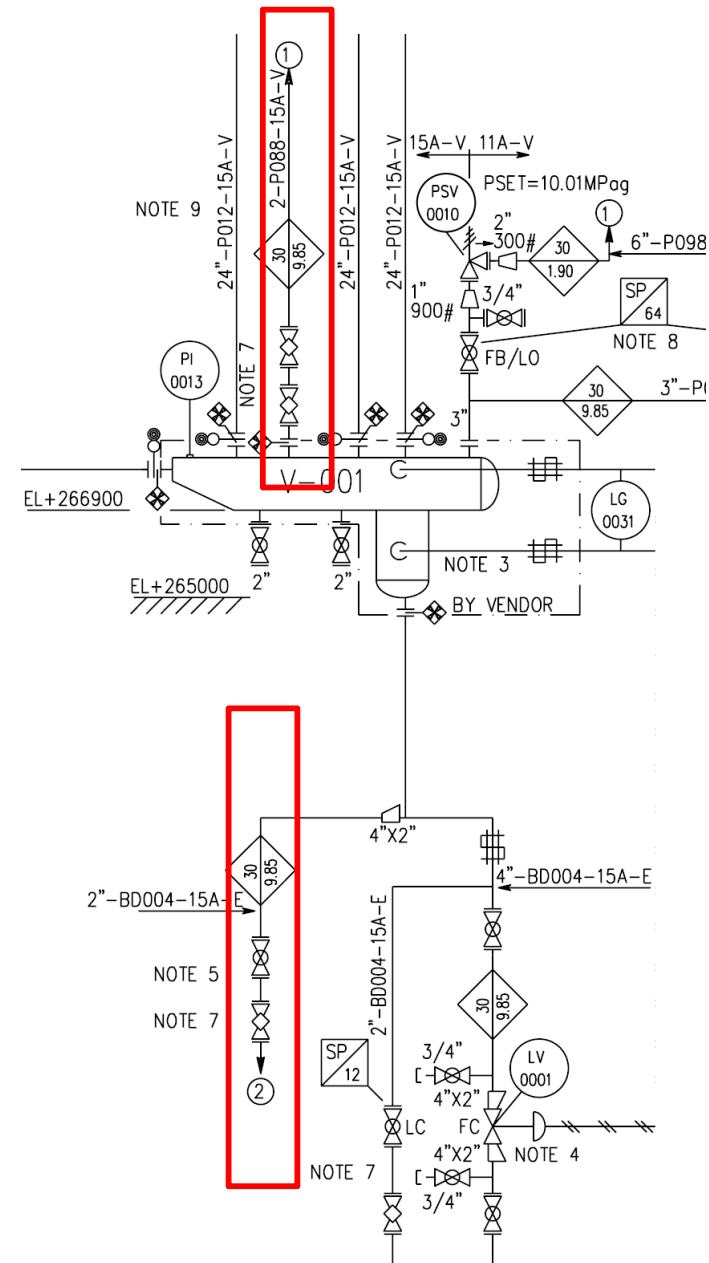
Ease of operation and maintenance:

- Isolation /bypass of equipment
- Isolation/bypass of valves

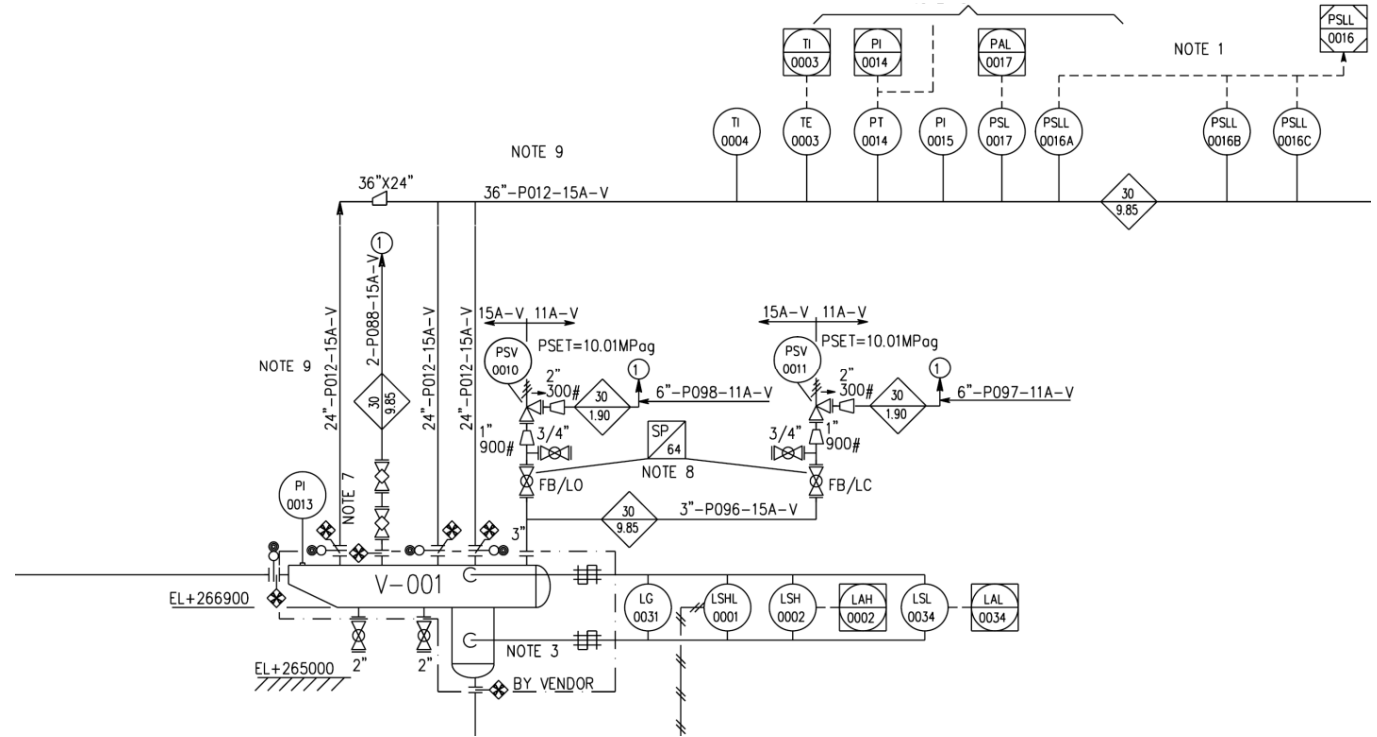


Ease of operation and maintenance:

- Isolation /bypass of equipment
- Isolation/bypass of valves
- Vents/drains



What purpose does a P&ID serve?



At design stage:

- Defines the design basis for Piping & Instrumentation disciplines
- Serves to show and agree the operating and maintenance features between Engineer and Owner or **between Engineer and Vendor**

Scope of supply:
counter flange to be supplied by vendor, as per contractual specification

Vendor to provide necessary reducer and counter flange to match customer connection of 4"

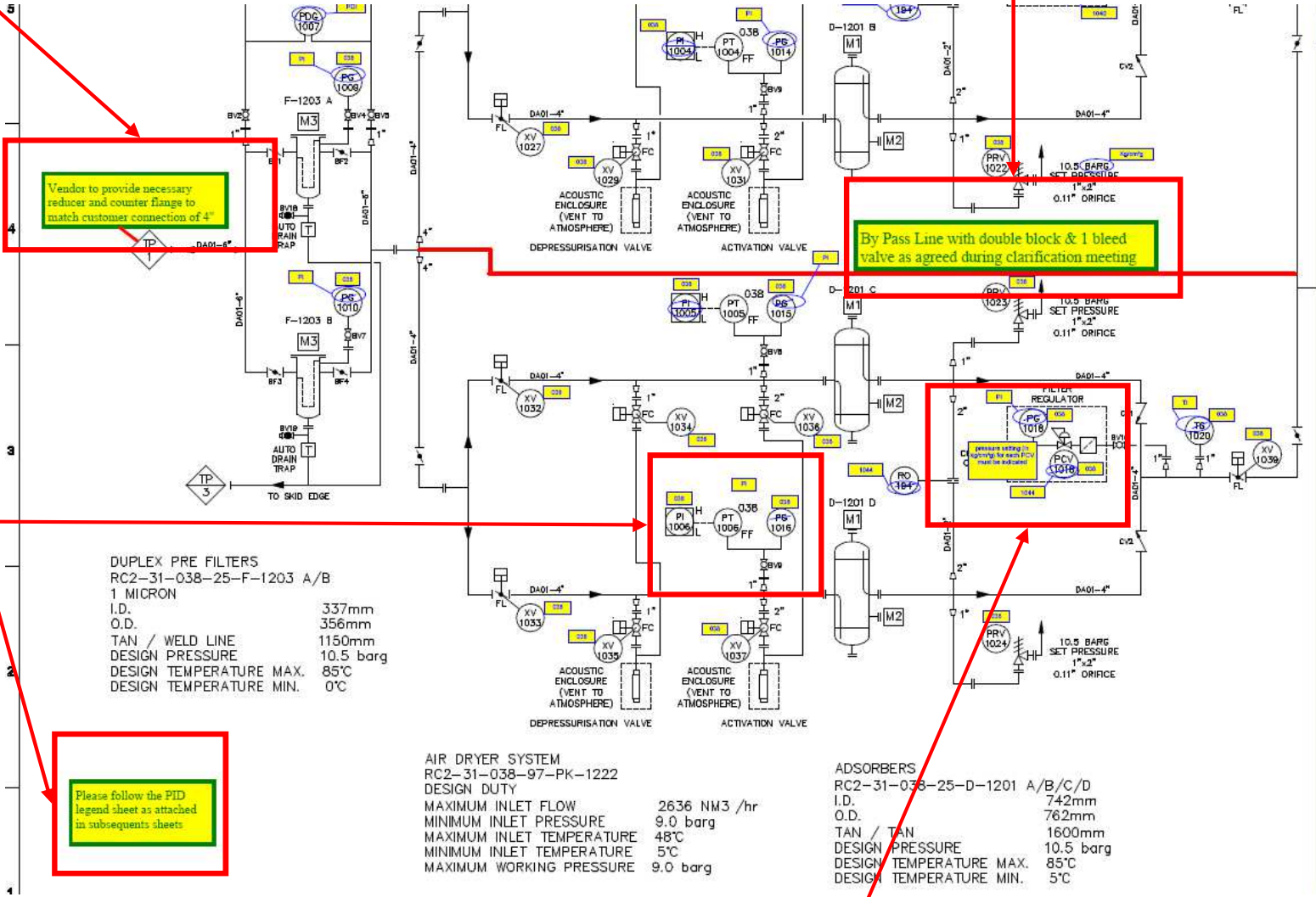
Comments on Instrument numbering and installation:
Vendor P&ID shall use the same nomenclature than project's P&ID

Please follow the PID legend sheet as attached in subsequent sheets

Decision during a clarification meeting with vendor, for instance to allow maintenance

By Pass Line with double block & 1 bleed valve as agreed during clarification meeting

Pressure setting to be agreed for each PCV (trap for reference)



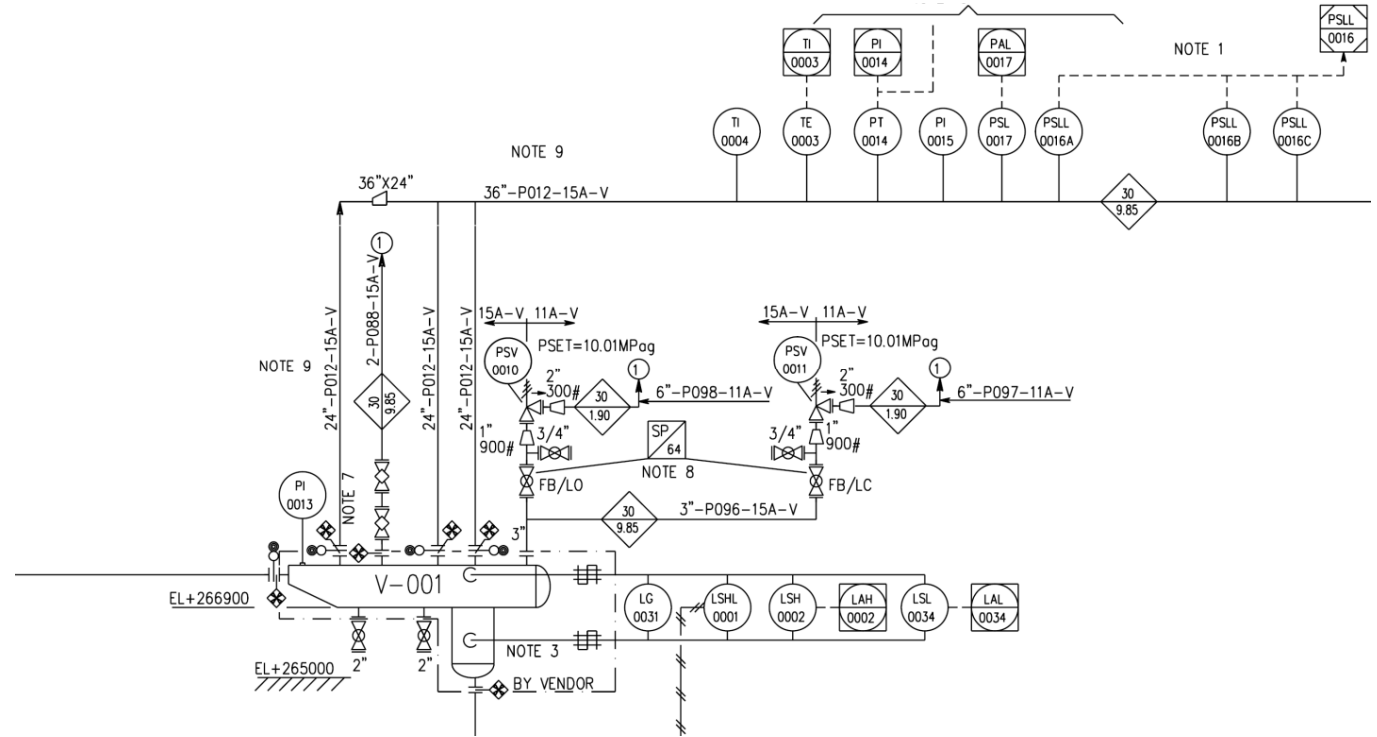
DUPLEX PRE FILTERS
RC2-31-038-25-F-1203 A/B
1 MICRON
I.D. 337mm
O.D. 356mm
TAN / WELD LINE 1150mm
DESIGN PRESSURE 10.5 barg
DESIGN TEMPERATURE MAX. 85°C
DESIGN TEMPERATURE MIN. 0°C

AIR DRYER SYSTEM
RC2-31-038-97-PK-1222
DESIGN DUTY
MAXIMUM INLET FLOW 2636 NM³ /hr
MINIMUM INLET PRESSURE 9.0 barg
MAXIMUM INLET TEMPERATURE 48°C
MINIMUM INLET TEMPERATURE 5°C
MAXIMUM WORKING PRESSURE 9.0 barg

ADSORBERS
RC2-31-038-25-D-1201 A/B/C/D
I.D. 742mm
O.D. 762mm
TAN / TAN 1600mm
DESIGN PRESSURE 10.5 barg
DESIGN TEMPERATURE MAX. 85°C
DESIGN TEMPERATURE MIN. 5°C

Missing information: setting pressure of PCV shall be indicated on P&ID

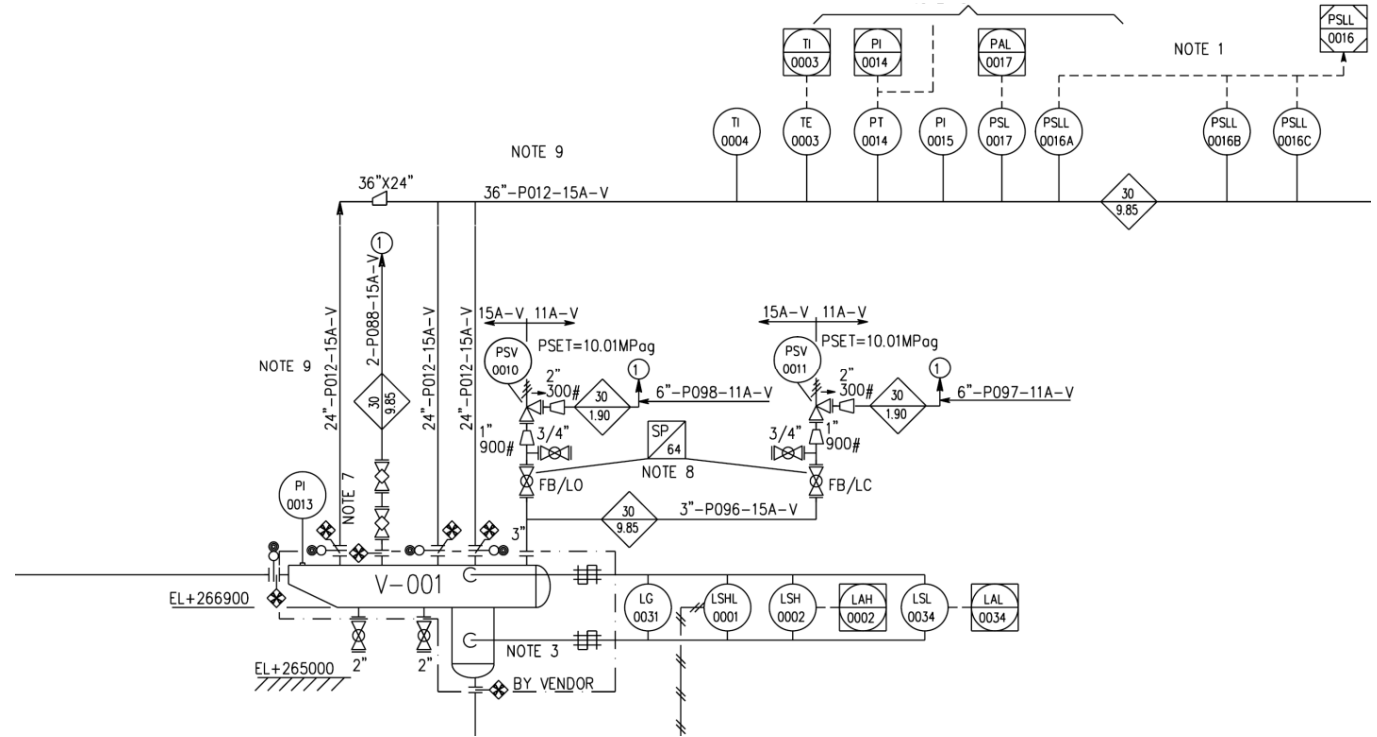
What purpose does a P&ID serve?



At design stage:

- Defines the design basis for Piping & Instrumentation disciplines
- Serves to show and agree the operating and maintenance features between Engineer and Owner or between Engineer and Vendor
- Serves to show the interface with equipment/package vendors

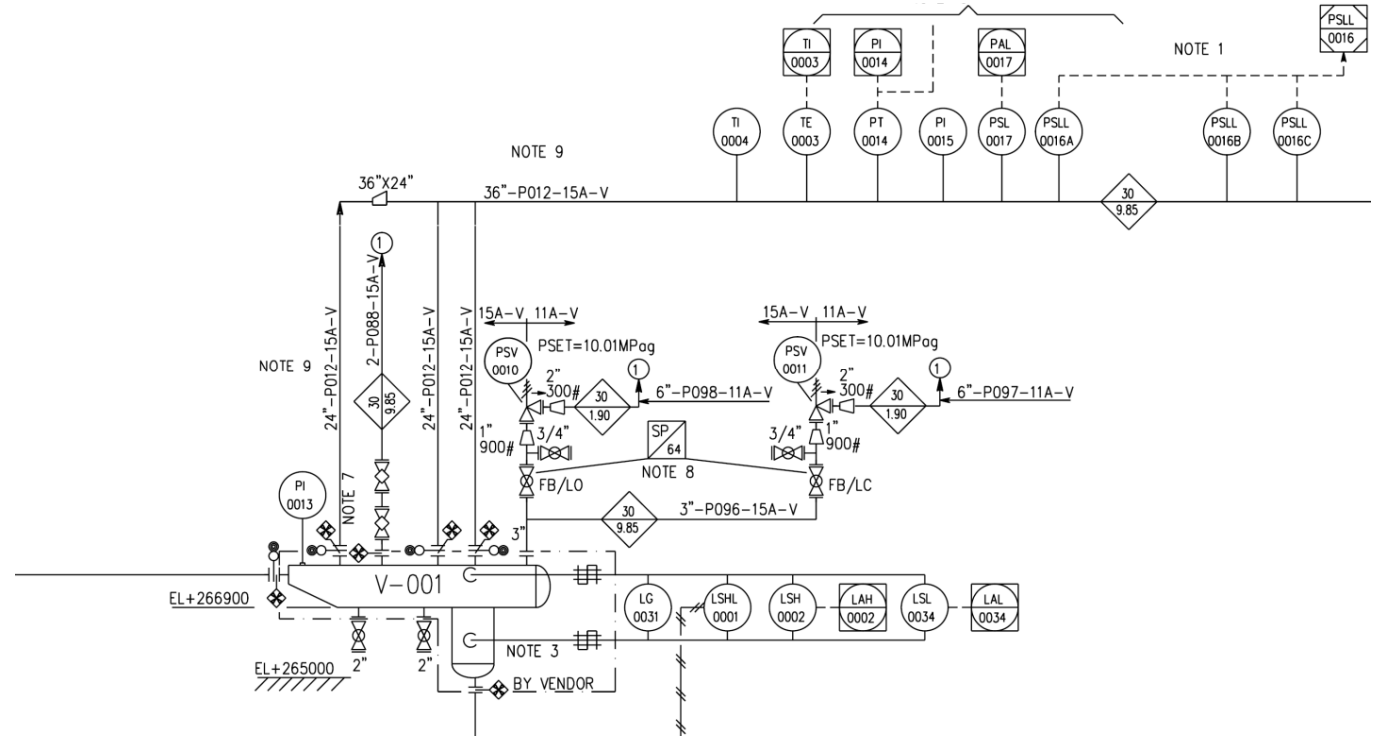
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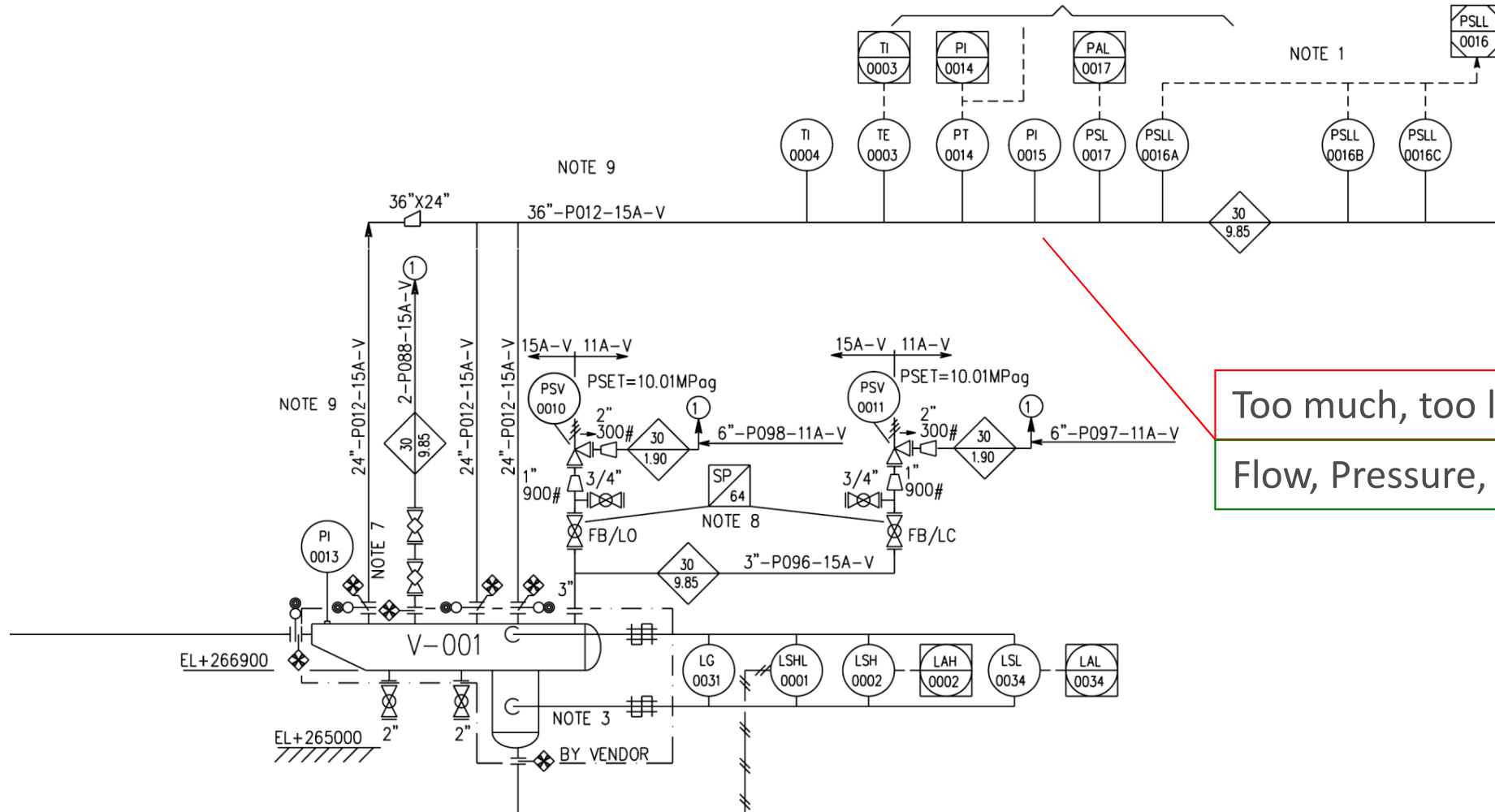
- Defines the design basis for Piping & Instrumentation disciplines
- Serves to show and agree the operating and maintenance features between Engineer and Owner or between Engineer and Vendor
- Serves to show the interface with equipment/package vendors
- Perform HAZOP review

What purpose does a P&ID serve?



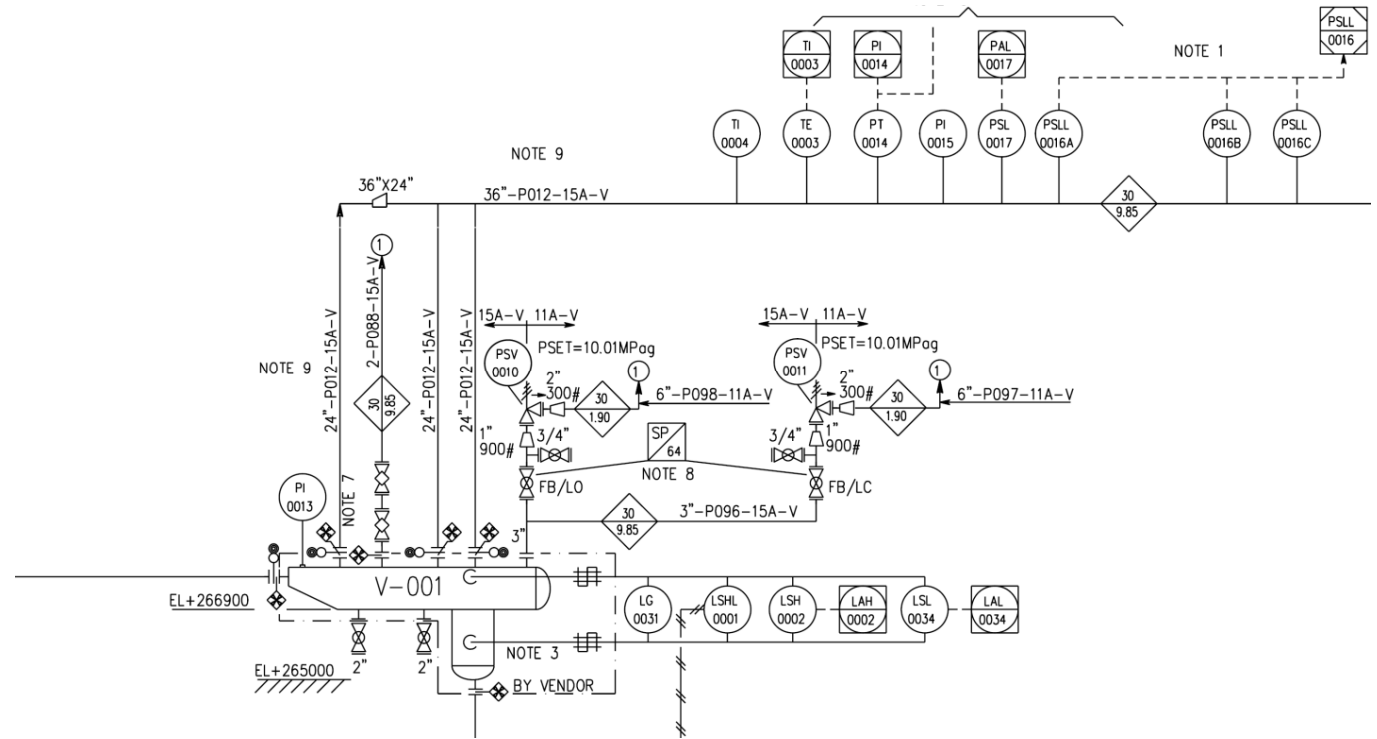
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Too much, too little, no
Flow, Pressure, Temperature

What purpose does a P&ID serve?

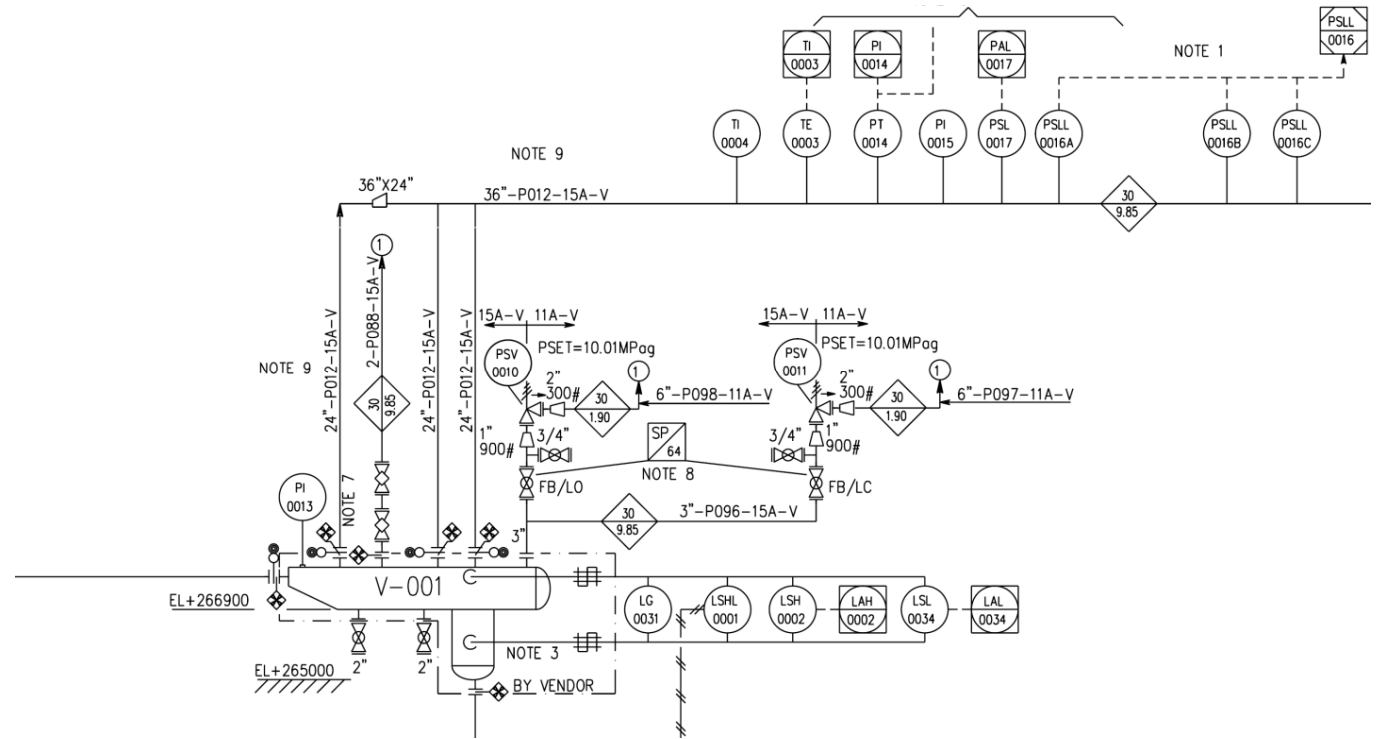


At design stage:

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During operation:

What purpose does a P&ID serve?



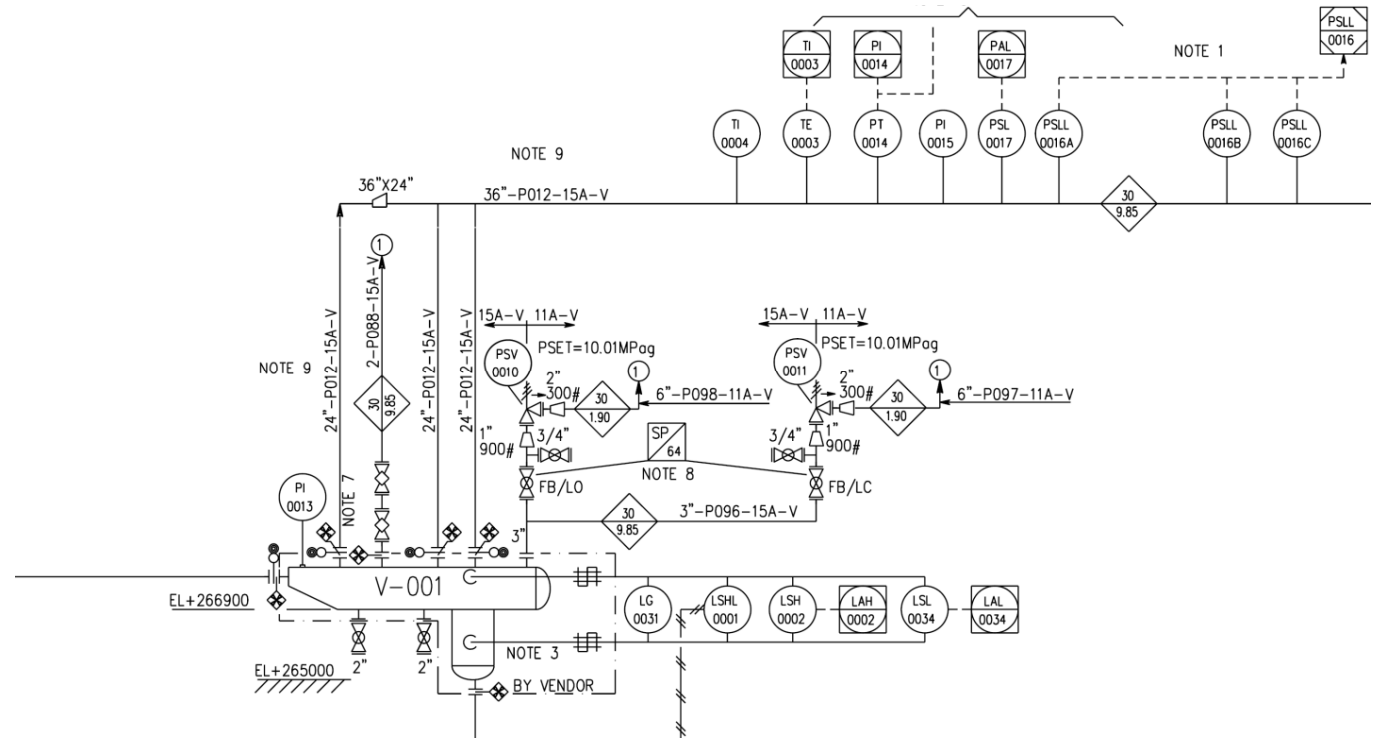
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During operation:

- Reference drawing for operator, work permit, plant modifications etc.

What purpose does a P&ID serve?

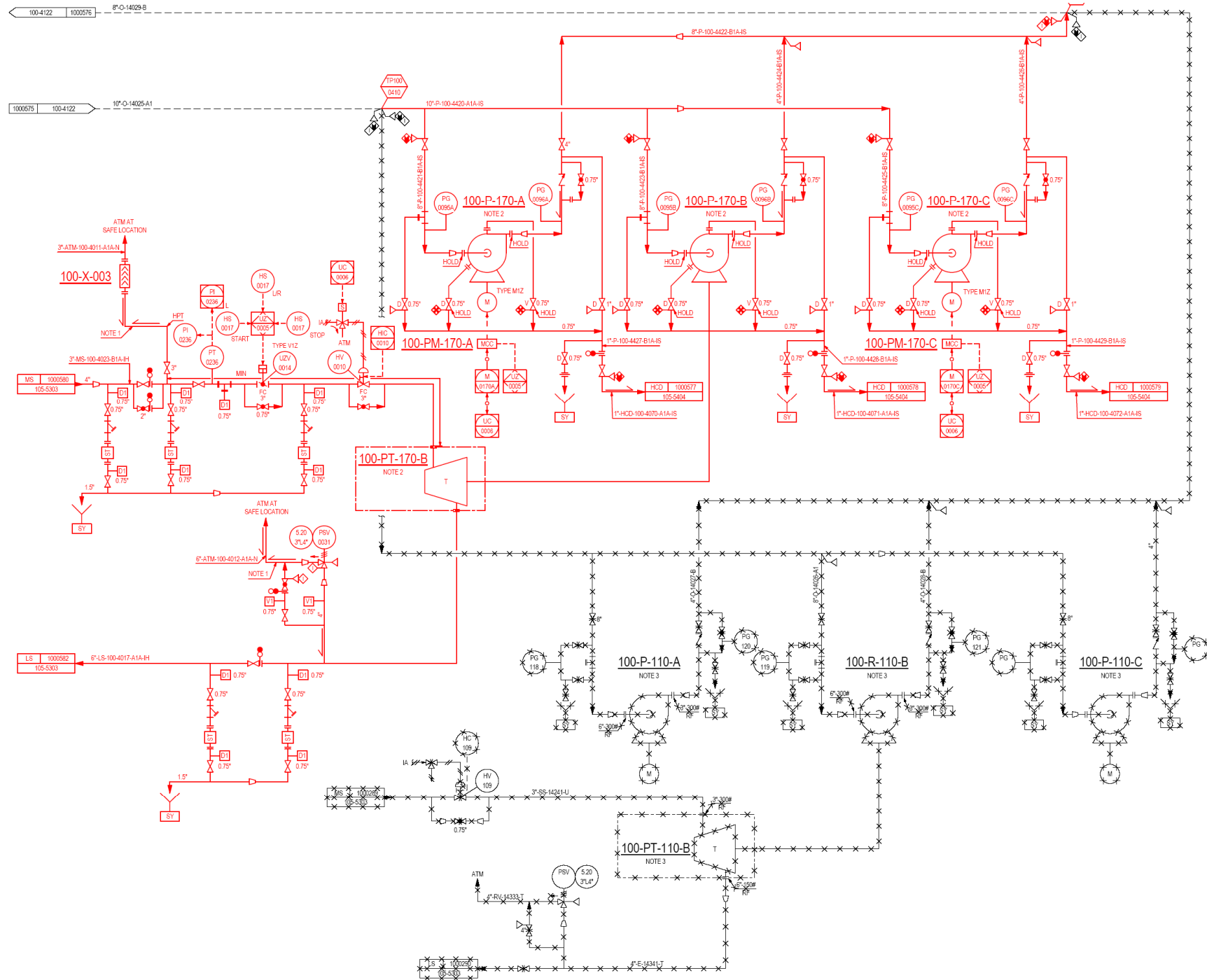


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- Perform HAZOP review

During operation:

- Reference drawing for operator, work permit, **plant modifications** etc.



■ Important features

Normal operation

- Redundancy for critical instruments / safety switches

Shutdown

- Check valves

Start-up

- Pressurization
- warm-up / purge lines

Maintenance

- Equipment isolation & bypass: valves, spectacle/blind
- Nitrogen injection, vent
- Drains
- Control and ON/OFF valves isolation
- Instrument isolation

It includes:

1. All itemized equipment,
2. Item number and service description of each equipment with relevant design condition
3. All process and utilities lines, with indication of
 - Diameter
 - Rating
 - Material
 - Service
 - Line number (if applicable)
 - Piping class
 - Piping class break / change
 - External finishing (such as insulation, personal protection, tracing...)

4. **Battery limits between Parties, e.g. contractor and vendor**
5. **All valves and fittings on lines (including block valves, check valves, strainers), connections on equipment and vessels,**
6. **All instruments with detailed control loops:**
 - All instruments shall be tagged as per united numbering system,
 - Local instruments or instruments on local panel,
 - Sequences and interlocks (with brief description e.g.: comp. start / stop, permissive to start, etc.),
7. **Control valves ,**
8. **Safety valves (with set point and inlet/outlet size),**

9. **Particular data or notes relevant to equipment/instruments installation, such as:**
 - Max or mini length of piping (requirement regarding suction / discharge piping straight length, etc.),
 - Slope of piping
 - Elevation of equipment
 - Safe location requirement
 - Control and monitoring signals for rotating equipments and electrical motors (if applicable),

10. **Item number and service description of each equipment with relevant design condition**

It shall be drawn-up according to ISA 6.12 requirements.

- **Various types of P&IDs**
 - Legend and Symbols
 - Details and Typical
 - Process or Utility P&ID
 - Distribution P&ID
 - Interconnection P&ID
 - Pumps auxiliary P&ID
 - Package P&ID

<p>LINE SYMBOLS</p> <p>PRIMARY LINE MAIN PROCESS LINE IN P&ID MAIN & SUBHEADER IN HEADER DIAGRAM</p> <p>SECONDARY LINE OTHER PROCESS LINE IN P&ID UTILITY/ANALOGY LINE IN P&ID BRANCH LINE IN HEADER DIAGRAM</p> <p>UNDERGROUND LINE</p> <p>TRACED LINE</p> <p>STEAM JACKETED LINE</p> <p>GP LINE WITH CATHODIC PROTECTION</p> <p>EXISTING P&ID</p> <p>NEW LINE</p> <p>DISMANTLING LINE</p>	<p>VALVE SYMBOLS</p> <p>GATE VALVE</p> <p>GLOBE VALVE</p> <p>Y TYPE GLOBE VALVE</p> <p>ANGLE GLOBE VALVE</p> <p>BALL VALVE (REDUCED BORE)</p> <p>PLUG VALVE</p> <p>BUTTERFLY VALVE</p> <p>NEEDLE VALVE</p> <p>DIAPHRAGM VALVE</p> <p>PINCH VALVE</p> <p>CHECK VALVE</p> <p>STOP CHECK VALVE</p> <p>Y STOP CHECK VALVE</p>	<p>OPEN / CLOSE STATUS OF VALVES VALVE TYPE TO BE PER VALVE SYMBOLS</p> <p>LOCKED OPENED VALVE WITH INTERLOCK SYSTEM</p> <p>LOCKED CLOSED VALVE WITH INTERLOCK SYSTEM</p> <p>NORMALLY OPENED VALVE</p> <p>NORMALLY CLOSED VALVE</p> <p>LOCKED OPEN</p> <p>LOCKED CLOSE</p>	<p>DRAIN / VENT / BLEEDER VALVE TYPE, SIZE AND END TYPE TO BE PER PIPING SPECIFICATION</p> <p>SINGLE VALVE</p> <p>DOUBLE VALVE</p>
<p>LINE ATTRIBUTE BREAK</p> <p>PIPING SERVICE CLASS BREAK</p> <p>INSULATION / TRACING BREAK</p> <p>LINE NUMBER BREAK (LINE SERVICE CODE, SYSTEM CODE, UNIT CODE, LINE SERIAL NUMBER)</p>	<p>SPECIAL VALVE SYMBOLS</p> <p>SP-YZXX Y : SYSTEM CODE Z : UNIT CODE XX : SERIAL NUMBER</p> <p>3-WAY BALL VALVE</p> <p>3-WAY PLUG VALVE</p> <p>4-WAY PLUG VALVE</p> <p>Y INTERMITTENT BLOWDOWN VALVE</p> <p>ANGLE CONTINUOUS BLOWDOWN VALVE</p> <p>SPECIAL CHECK VALVE (NOTE 4)</p> <p>AUTO RECIRCULATION VALVE</p> <p>SPECIAL SAMPLING VALVE (WITH JACKET)</p>	<p>MISCELLANEOUS PIPING RELATED SYMBOLS</p> <p>OPEN VENT (SQUARE CUT)</p> <p>OPEN VENT (ROUND CUT)</p> <p>OPEN VENT WITH GOOSENECK</p> <p>REMOVABLE SPOOL</p> <p>SWING ELBOW</p> <p>OPEN FUNNEL OW : OILY CONTAMINATED WATER HW : NON CONTAMINATED WATER CS : CHEMICAL CONTAMINATED WATER</p> <p>WEEP HOLE</p> <p>PIPING HEADER</p> <p>CROSSING TEE FOR JACKET PIPE</p>	<p>TAGGED PIPING COMPONENT SYMBOLS</p> <p>SP-YZXX Y : SYSTEM CODE Z : UNIT CODE XX : SERIAL NUMBER</p> <p>FLAME ARRESTOR</p> <p>CONE STRAINER</p> <p>Y TYPE STRAINER</p> <p>T TYPE STRAINER</p> <p>BATHTUB TYPE STRAINER</p> <p>BUCKET TYPE STRAINER</p> <p>DUPLEX STRAINER</p> <p>STEAM TRAP (FOR EQUIPMENT)</p> <p>VACUUM BREAKER</p> <p>EXHAUST HEAD</p> <p>EXPANSION JOINT</p> <p>IN-LINE STATIC MIXER</p> <p>FLEXIBLE HOSE (FLANGED)</p> <p>FLEXIBLE HOSE (COUPLING)</p> <p>SIGHT GLASS</p> <p>PULSATION DAMPER</p> <p>CORROSION COUPLONE</p> <p>CORROSION PROBE</p>
<p>FITTING SYMBOLS</p> <p>FLANGE</p> <p>BI-METALLIC TRANSITION JOINT</p> <p>REDUCING FLANGE</p> <p>BLIND FLANGE</p> <p>UNION</p> <p>WELDED END CAP</p> <p>SREWED PLUG</p> <p>SREWED CAP</p> <p>REDUCER (NOTE 1)</p> <p>ECCENTRIC REDUCER (NOTE 2)</p> <p>SPECTACLE BLIND (NORMAL OPEN)</p> <p>SPECTACLE BLIND (NORMAL CLOSE)</p> <p>BLIND SPACER (BLIND PLATE) (NOTE 3)</p> <p>OPEN SPACER (SPACER RING) (NOTE 3)</p> <p>HOSE CONNECTION (GENERAL / WATER)</p> <p>HOSE CONNECTION (STEAM)</p> <p>HOSE CONNECTION (AIR)</p> <p>HOSE CONNECTION (NITROGEN)</p> <p>IF INSULATION FLANGE</p> <p>MH FRONT MANHOLE</p> <p>MH SIDE MANHOLE</p>	<p>ATTRIBUTE OF VALVES VALVE TYPE TO BE PER VALVE SYMBOLS</p> <p>FULL BORE VALVE</p> <p>FULL JACKETED VALVE</p> <p>SEMI JACKETED VALVE</p> <p>VALVE WITH VENT HOLE (NOTE 5)</p> <p>CHECK VALVE WITH DRAIN HOLE</p> <p>HIGHER RATING VALVE</p>	<p>PIPING ASSEMBLY SYMBOLS</p> <p>Y : SYSTEM CODE Z : UNIT CODE XX : SERIAL NUMBER</p> <p>8" ZXX SAMPLE CONNECTION ASSEMBLY * : SAMPLE CONNECTION TYPE NUMBER</p> <p>T STEAM TRAP ASSEMBLY</p> <p>STH-AGX-YZXX STEAM TRACE HEADER ASSEMBLY</p> <p>CRH-AGX-YZXX CONDENSATE RECOVERY HEADER ASSEMBLY</p> <p>EMS-YZXX SAFETY SHOWER AND EYE WASH</p> <p>HS-YZXX UTILITY STATION</p>	<p>SPECIAL SYMBOLS</p> <p>SPECIAL ANGLE ELBOW</p> <p>SPECIAL LATERAL TEE</p> <p>SPECIAL WYE FITTING</p> <p>SPECIAL DIMENSION REDUCER</p> <p>REINFORCEMENT FOR AV (RUN PIPE ONLY)</p> <p>REINFORCEMENT FOR AV (RUN AND BRANCH PIPE)</p>

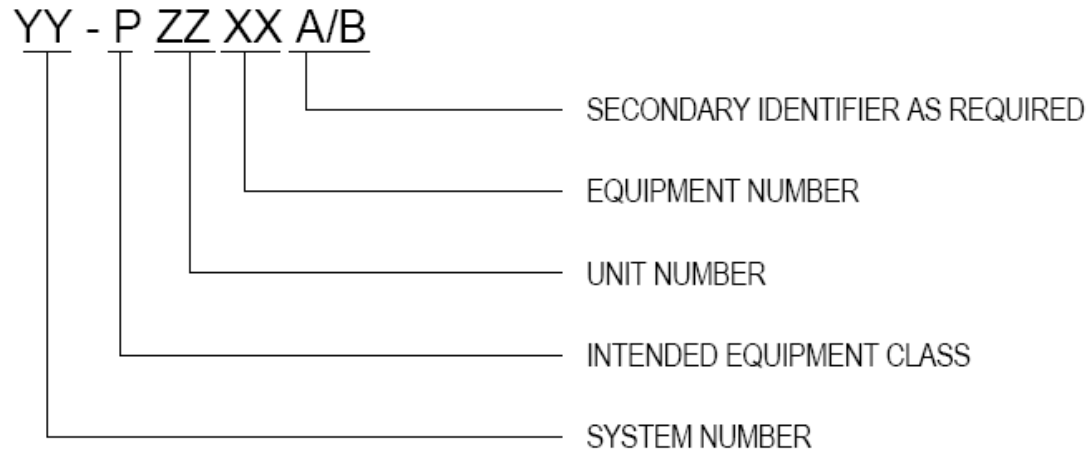
- Various types of P&IDs
 - Legend and Symbols
 - Identification and numbering system
 - General Symbols
 - Equipment symbols
 - Piping Symbols
 - Instrument Symbols

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 - Piping Symbols
 - Instrument Symbols

EQUIPMENT IDENTIFICATION	LINE IDENTIFICATION	INSTRUMENT IDENTIFICATION																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
<p>EQUIPMENT IDENTIFICATION</p> <p>MAIN EQUIPMENT</p> <p>YY - P ZZ XX A/B</p> <ul style="list-style-type: none"> SECONDARY IDENTIFIER AS REQUIRED EQUIPMENT NUMBER UNIT NUMBER INTENDED EQUIPMENT CLASS SYSTEM NUMBER <p>AUXILIARY EQUIPMENT FOR MAIN EQUIPMENT</p> <p>YY - K ZZ XX - P 1 A</p> <ul style="list-style-type: none"> SECONDARY IDENTIFIER AS REQUIRED SERIAL NUMBER (AUXILIARY) INTENDED EQUIPMENT CLASS EQUIPMENT NUMBER FOR MAIN EQUIPMENT <p>YY - K ZZ XX - T H 1 A</p> <ul style="list-style-type: none"> MANIFOLD DESIGNATOR IF REQUIRED SERIAL NUMBER (AUXILIARY) HEATER IDENTIFICATION INTENDED EQUIPMENT CLASS EQUIPMENT NUMBER FOR MAIN EQUIPMENT 	<p>LINE IDENTIFICATION</p> <p>NG Y XXX - 24" (1C3AS1) - 1 () ()</p> <ul style="list-style-type: none"> INSULATION THICKNESS (MM) NORMAL OPERATING TEMP. INSULATION TYPE PIPING SERVICE CLASS LINE SIZE LINE SERIAL NUMBER LINE NUMBER LINE SERVICE CODE <p>JACKETED LINE</p> <p>SLYXXX-6"(1T3J) - C () - 8" () ()</p> <ul style="list-style-type: none"> INSULATION THICKNESS (MM) OUTER PIPE OPERATING TEMP. OUTER PIPE SIZE INNER PIPE OPERATING TEMP. INNER PIPE SIZE 	<p>INSTRUMENT IDENTIFICATION</p> <p>Y FC Z XXX B A</p> <ul style="list-style-type: none"> LETTER SUFFIX FOR FUNCTIONAL IDENTIFICATION OR PARALLEL ELEMENTS AS REQUIRED LETTER SUFFIX FOR IDENTICAL SYSTEMEQUIPMENT WHEN SPECIFIED SEQUENCE NUMBER UNIT CODE FUNCTIONAL IDENTIFICATION SYSTEM NUMBER <p>SYSTEM NUMBER</p> <p>FOR SYSTEM NUMBERS 01 THROUGH 09, A SINGLE DIGIT NUMERICAL SHALL BE DESIGNATED BY TRUNCATING 0 FROM ITS SYSTEM NUMBER.</p> <p>SEQUENCE NUMBER</p> <p>INSTRUMENT LOOP NUMBER SHALL BE ASSIGNED AS FOLLOWS: 00 TO 99 - LOOPED INSTRUMENT 000 TO 999 - NON-LOOPED INSTRUMENT (FIELD GAGE / FIELD POINT)</p> <p>WHEN INSTRUMENTS ARE SUPPLIED BY PACKAGE VENDOR, PACKAGE NUMBER (A TO Z) WHICH WILL BE ASSIGNED TO EACH PACKAGE VENDOR IS USED. PACKAGE NUMBER IS PUT BEFORE SEQUENCE NUMBER IN CASE LETTER SUFFIX FOR IDENTICAL EQUIPMENT UNIT</p> <p>LETTER SUFFIX FOR IDENTICAL EQUIPMENT UNIT SHOULD NORMALLY BE BLANK. IF THERE ARE IDENTICAL EQUIPMENT IN SAME UNIT CODE, LETTER SUFFIX WILL BE USED WITH THE SAME LOOP NUMBER.</p> <p>LETTER SUFFIX FOR FUNCTIONAL IDENTIFICATION OR PARALLEL ELEMENTS</p> <p>FOR INDICATING LOCATION OR FUNCTION OF INSTRUMENTS SPECIALLY, SPECIAL LETTER SUFFIX SPECIFIED IN SYMBOL LEAD SHEET WILL BE APPENDED OUTSIDE OF INSTRUMENT SYMBOLS FOR LOCATION OR INSIDE FOR FUNCTION. IF GIVEN LOOP HAS MORE THAN ONE INSTRUMENT WITH SAME FUNCTIONAL IDENTIFICATION, SUFFIX LETTER FOR PARALLEL ELEMENTS WILL BE APPENDED INSIDE OF INSTRUMENT SYMBOLS.</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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<tr><td>PD</td><td>PUMP DIESEL ENGINES</td></tr> <tr><td>PM</td><td>PUMP MOTORS</td></tr> <tr><td>S</td><td>FILTER</td></tr> <tr><td>T</td><td>TANK, PIT, SILO, HOPPER</td></tr> <tr><td>V</td><td>VESSEL, DRUM, CONVERTER, REACTOR</td></tr> <tr><td>X</td><td>MISCELLANEOUS</td></tr> <tr><td>XC</td><td>CRANE</td></tr> <tr><td>XH</td><td>STEEL STRUCTURE, SHELTERS, WAREHOUSE, PLATFORM</td></tr> <tr><td>XK</td><td>BUILDING, LOADING STATION</td></tr> <tr><td>XM</td><td>MIXER</td></tr> <tr><td>XP</td><td>PORTABLE EQUIPMENT</td></tr> <tr><td>XZ</td><td>FIRE AND SAFETY EQUIPMENT</td></tr> <tr><td>Y</td><td>PACKAGE UNIT</td></tr> <tr><td>(DRIVER)</td><td></td></tr> <tr><td>D</td><td>DIESEL ENGINE</td></tr> <tr><td>M</td><td>MOTOR</td></tr> <tr><td>T</td><td>TURBINE</td></tr> <tr><td>(*</td><td>EQUIPMENT CLASS OF DRIVEN EQUIPMENT, E.G., E, G, K, P)</td></tr> </tbody> </table>	DESIGNATION	EQUIPMENT	A	POND, BASIN, CONCRETE PIT	B	BOILERS	C	COLLINS	D	DESUPERHEATERS	E	HEAT EXCHANGERS, AIR COOLED EXCHANGERS	EM	AIR COOLER MOTORS	F	FURNACE	FL	FLARE	G	ELECTRIC GENERATOR	GD	GENERATOR DIESEL ENGINES	GT	GENERATOR TURBINES	H	ELECTRIC HEATER	K	COMPRESSOR, BLOWER	MD	COMPRESSOR DIESEL ENGINES	MM	COMPRESSOR MOTORS	KT	COMPRESSOR GAS TURBINES	L	LOADING ARM	LB	LIQUID BURNER	P	PUMP	PD	PUMP DIESEL ENGINES	PM	PUMP MOTORS	S	FILTER	T	TANK, PIT, SILO, HOPPER	V	VESSEL, DRUM, CONVERTER, REACTOR	X	MISCELLANEOUS	XC	CRANE	XH	STEEL STRUCTURE, SHELTERS, WAREHOUSE, PLATFORM	XK	BUILDING, LOADING STATION	XM	MIXER	XP	PORTABLE EQUIPMENT	XZ	FIRE AND SAFETY EQUIPMENT	Y	PACKAGE UNIT	(DRIVER)		D	DIESEL ENGINE	M	MOTOR	T	TURBINE	(*	EQUIPMENT CLASS OF DRIVEN EQUIPMENT, E.G., E, G, K, P)	<p>LINE SERVICE CODE</p> <table border="1"> <thead> <tr> <th>PROCESS FLUID</th> <th>AUXILIARY FLUID (CONT)</th> </tr> </thead> <tbody> <tr><td colspan="2">PROCESS GENERAL</td></tr> <tr><td>A</td><td>AIR</td></tr> <tr><td>AG</td><td>ACID GAS</td></tr> <tr><td>BT</td><td>BUTANE</td></tr> <tr><td>DG</td><td>DEFROST GAS</td></tr> 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<tr><td>N</td><td>NITROGEN</td></tr> <tr><td>NI</td><td>LIQUID NITROGEN</td></tr> <tr><td colspan="2">STEAM / CONDENSATE</td></tr> <tr><td>HS</td><td>HIGH PRESSURE STEAM</td></tr> <tr><td>HHS</td><td>HIGH HIGH PRESSURE STEAM</td></tr> <tr><td>MS</td><td>MEDIUM PRESSURE STEAM</td></tr> <tr><td>LS</td><td>LOW PRESSURE STEAM</td></tr> <tr><td>CC</td><td>CONDENSATE (SUSPECT) CONDENSATE</td></tr> <tr><td>SC</td><td>STEAM CONDENSATE</td></tr> <tr><td>SOC</td><td>COLD CONDENSATE</td></tr> <tr><td>SCH</td><td>HP STEAM CONDENSATE</td></tr> <tr><td>SCL</td><td>LP STEAM CONDENSATE</td></tr> <tr><td>SM</td><td>MP STEAM CONDENSATE</td></tr> <tr><td>SCT</td><td>TURBINE CONDENSATE</td></tr> <tr><td colspan="2">FUEL</td></tr> <tr><td>FG</td><td>FUEL GAS</td></tr> <tr><td>FO</td><td>FUEL OIL</td></tr> <tr><td colspan="2">WATER</td></tr> <tr><td>BW</td><td>BOILER FEED WATER / SOFTENED WATER</td></tr> <tr><td>CHS</td><td>CHILLED WATER SUPPLY</td></tr> <tr><td>CHR</td><td>CHILLED WATER RETURN</td></tr> 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MODIFYING LETTER MAY MODIFY EITHER FIRST LETTER OR SUCCEEDING LETTER, AS APPLICABLE.</p> <p>IF INSTRUMENTS SUCH AS LIMIT SWITCH RELATED INSTRUMENTS ("Z" FOR FIRST LETTER) AND HAND RELATED INSTRUMENTS ("Y" FOR FIRST LETTER) BELONG TO MAIN FUNCTIONED INSTRUMENT SUCH AS VALVES OR LOGICS AND HAVE DIFFERENT FIRST LETTER FROM MAIN FUNCTIONED INSTRUMENT (SUCH AS "SP", "SD", "SQ", "MO", "P", "L", "T", "P", "K", "L", "U"), FIRST CHARACTER OF MAIN FUNCTIONED INSTRUMENT (SUCH AS "E", "F", "S", "M", "P", "L", "T", "P", "K", "L", "U") SHALL BE APPENDED TO FUNCTIONAL IDENTIFICATION OF BELONGING INSTRUMENTS (SUCH AS "2"E", "2"L", "1"MF AND "1"PF), AND SAME LOOP NUMBER AS MAIN FUNCTIONED INSTRUMENTS SHALL BE ASSIGNED</p> <table border="1"> <thead> <tr> <th rowspan="2">FIRST LETTERS</th> <th colspan="4">SUCCEEDING LETTERS</th> </tr> <tr> <th>MEASURED OR INITIATING VARIABLE</th> <th>MODIFIER</th> <th>READOUT OR PASSIVE FUNCTION</th> <th>OUTPUT FUNCTION</th> </tr> </thead> <tbody> <tr><td>A</td><td>ANALYSIS</td><td></td><td>ALARM</td><td></td></tr> <tr><td>B</td><td>BURNER</td><td></td><td></td><td></td></tr> <tr><td>BD</td><td>BLOWDOWN</td><td></td><td></td><td>CLOSE</td></tr> <tr><td>C</td><td></td><td>DIFFERENTIAL</td><td>DEVIATION</td><td></td></tr> <tr><td>E</td><td>VOLTAGE</td><td></td><td>SENSOR (PRIMARY ELEMENT)</td><td></td></tr> <tr><td>ESD</td><td>EMERGENCY SHUTDOWN</td><td></td><td></td><td></td></tr> <tr><td>F</td><td>FLOW RATE</td><td>RAIO (FRACTION)</td><td></td><td></td></tr> <tr><td>G</td><td>FIRE & GAS</td><td></td><td>GAGE</td><td></td></tr> <tr><td>H</td><td>HAND</td><td></td><td></td><td>HIGH</td></tr> <tr><td>HH</td><td></td><td></td><td></td><td>HIGH HIGH</td></tr> <tr><td>I</td><td>CURRENT (ELECTRICAL)</td><td></td><td>INDICATE</td><td></td></tr> <tr><td>J</td><td>POWER</td><td></td><td></td><td></td></tr> <tr><td>K</td><td>SEQUENCE RELATED</td><td>TIME RATE OF CHANGE</td><td></td><td></td></tr> <tr><td>L</td><td>LEVEL</td><td></td><td>PLOT LAMP STATUS INDICATE</td><td>LOW</td></tr> <tr><td>LL</td><td></td><td></td><td></td><td>LOW LOW</td></tr> <tr><td>M</td><td></td><td></td><td></td><td>MIDDLE</td></tr> <tr><td>MO</td><td>MOTOR OPERATED</td><td></td><td></td><td></td></tr> <tr><td>N</td><td></td><td></td><td></td><td></td></tr> <tr><td>O</td><td></td><td></td><td>ORIFICE</td><td>OPEN</td></tr> <tr><td>P</td><td>PRESSURE VACUUM</td><td></td><td>POINT (TEST CONNECTION)</td><td></td></tr> <tr><td>PR</td><td>PRESSURE RELIEF</td><td></td><td></td><td></td></tr> <tr><td>Q</td><td></td><td>INTEGRATE TOTALIZE</td><td></td><td></td></tr> <tr><td>R</td><td>RESTRICTION</td><td>RECORD</td><td></td><td></td></tr> <tr><td>S</td><td>SPEED FREQUENCY</td><td>SAFETY</td><td>SWITCH</td><td></td></tr> <tr><td>SD</td><td>SHUTDOWN</td><td></td><td></td><td></td></tr> <tr><td>T</td><td>TEMPERATURE</td><td></td><td>TRANSMIT</td><td></td></tr> <tr><td>U</td><td>MULTIVARIABLE</td><td></td><td></td><td></td></tr> <tr><td>UP</td><td>DISC LOGIC</td><td></td><td></td><td></td></tr> <tr><td>UZ</td><td>PS LOGIC</td><td></td><td></td><td></td></tr> <tr><td>V</td><td>VIBRATION</td><td></td><td>VALVE</td><td></td></tr> <tr><td>W</td><td>TORQUE</td><td></td><td>WELL</td><td></td></tr> <tr><td>X</td><td>UNCLASSIFIED</td><td></td><td>UNCLASSIFIED</td><td>UNCLASSIFIED</td></tr> <tr><td>Y</td><td>EVENT STATE PRESENCE</td><td></td><td>RELAY, SOLENOID VALVE, COMPUTE CONVERT</td><td></td></tr> <tr><td>Z</td><td>POSITION DISPLACEMENT</td><td>SAFETY RELATED</td><td>EMERGENCY SWITCH</td><td></td></tr> </tbody> </table>	FIRST LETTERS	SUCCEEDING LETTERS				MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	A	ANALYSIS		ALARM		B	BURNER				BD	BLOWDOWN			CLOSE	C		DIFFERENTIAL	DEVIATION		E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		ESD	EMERGENCY SHUTDOWN				F	FLOW RATE	RAIO (FRACTION)			G	FIRE & GAS		GAGE		H	HAND			HIGH	HH				HIGH HIGH	I	CURRENT (ELECTRICAL)		INDICATE		J	POWER				K	SEQUENCE RELATED	TIME RATE OF CHANGE			L	LEVEL		PLOT LAMP STATUS INDICATE	LOW	LL				LOW LOW	M				MIDDLE	MO	MOTOR OPERATED				N					O			ORIFICE	OPEN	P	PRESSURE VACUUM		POINT (TEST CONNECTION)		PR	PRESSURE RELIEF				Q		INTEGRATE TOTALIZE			R	RESTRICTION	RECORD			S	SPEED FREQUENCY	SAFETY	SWITCH		SD	SHUTDOWN				T	TEMPERATURE		TRANSMIT		U	MULTIVARIABLE				UP	DISC LOGIC				UZ	PS LOGIC				V	VIBRATION		VALVE		W	TORQUE		WELL		X	UNCLASSIFIED		UNCLASSIFIED	UNCLASSIFIED	Y	EVENT STATE PRESENCE		RELAY, SOLENOID VALVE, COMPUTE CONVERT		Z	POSITION DISPLACEMENT	SAFETY RELATED	EMERGENCY SWITCH	
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V	VIBRATION		VALVE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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Y	EVENT STATE PRESENCE		RELAY, SOLENOID VALVE, COMPUTE CONVERT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
Z	POSITION DISPLACEMENT	SAFETY RELATED	EMERGENCY SWITCH																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				

EQUIPMENT IDENTIFICATION

MAIN EQUIPMENT

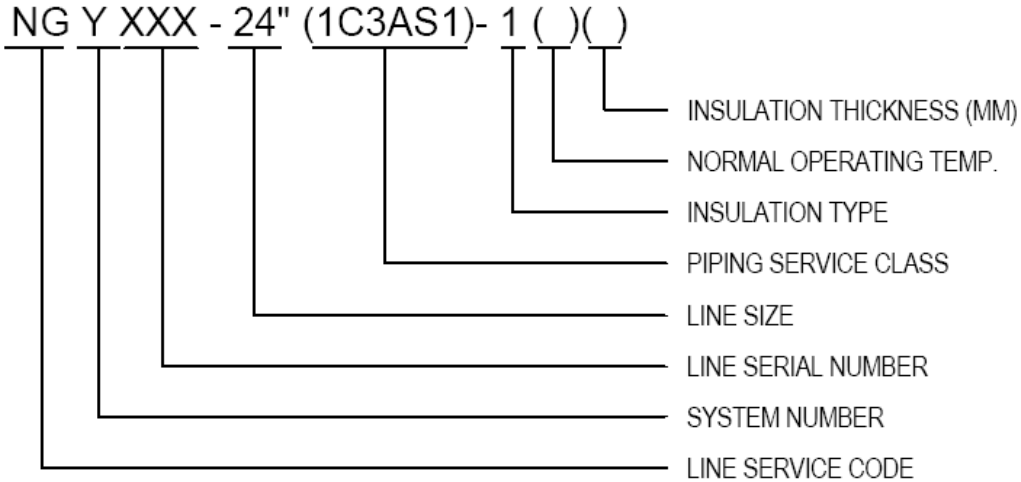


DESIGNATION

EQUIPMENT

A	: POND, BASIN, CONCRETE PIT
B	: BOILERS
C	: COLUMNS
D	: DESUPERHEATERS
E	: HEAT EXCHANGERS, AIR COOLED EXCHANGERS
EM	: AIR COOLER MOTORS
F	: FURNACE
FL	: FLARE
G	: ELECTRIC GENERATOR
GD	: GENERATOR DIESEL ENGINES
GT	: GENERATOR TURBINES
H	: ELECTRIC HEATER
K	: COMPRESSOR, BLOWER
KD	: COMPRESSOR DIESEL ENGINES
KM	: COMPRESSOR MOTORS
KT	: COMPRESSOR GAS TURBINES
L	: LOADING ARM
LB	: LIQUID BURNER
P	: PUMP
PD	: PUMP DIESEL ENGINES
PM	: PUMP MOTORS
S	: FILTER
T	: TANK, PIT, SILO, HOPPER
V	: VESSEL, DRUM, CONVERTER, REACTOR
X	: MISCELLANEOUS

LINE IDENTIFICATION



LINE SERVICE CODE

PROCESS FLUID

PROCESS GENERAL

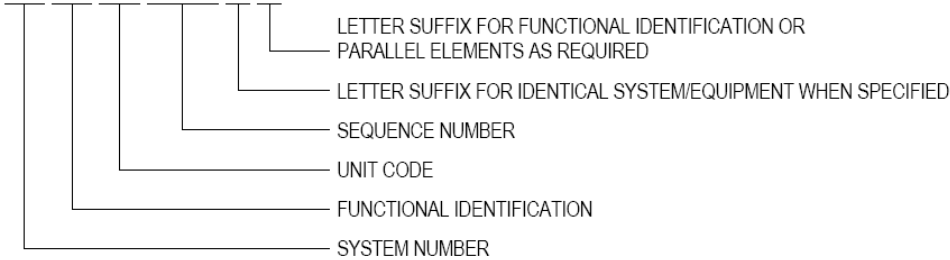
- A : AIR
- AG : ACID GAS
- BT : BUTANE
- DG : DEFROST GAS
- ET : ETHANE
- GL : NATURAL GAS LIQUID
- HG : HELIUM
- LG : LIQUEFIED NATURAL GAS
- LP : LIQUEFIED PETROLEUM GAS
- NG : NATURAL GAS
- OX : OXYGEN
- P : GENERAL PROCESS
- PP : PROPANE
- PC : PROCESS CONDENSATE
- PW : PROCESS WATER
- RS : RECOVERED SLOPS
- SU : SOUR CONDENSATE
- SL : LIQUID SULFUR

REFRIGERANT

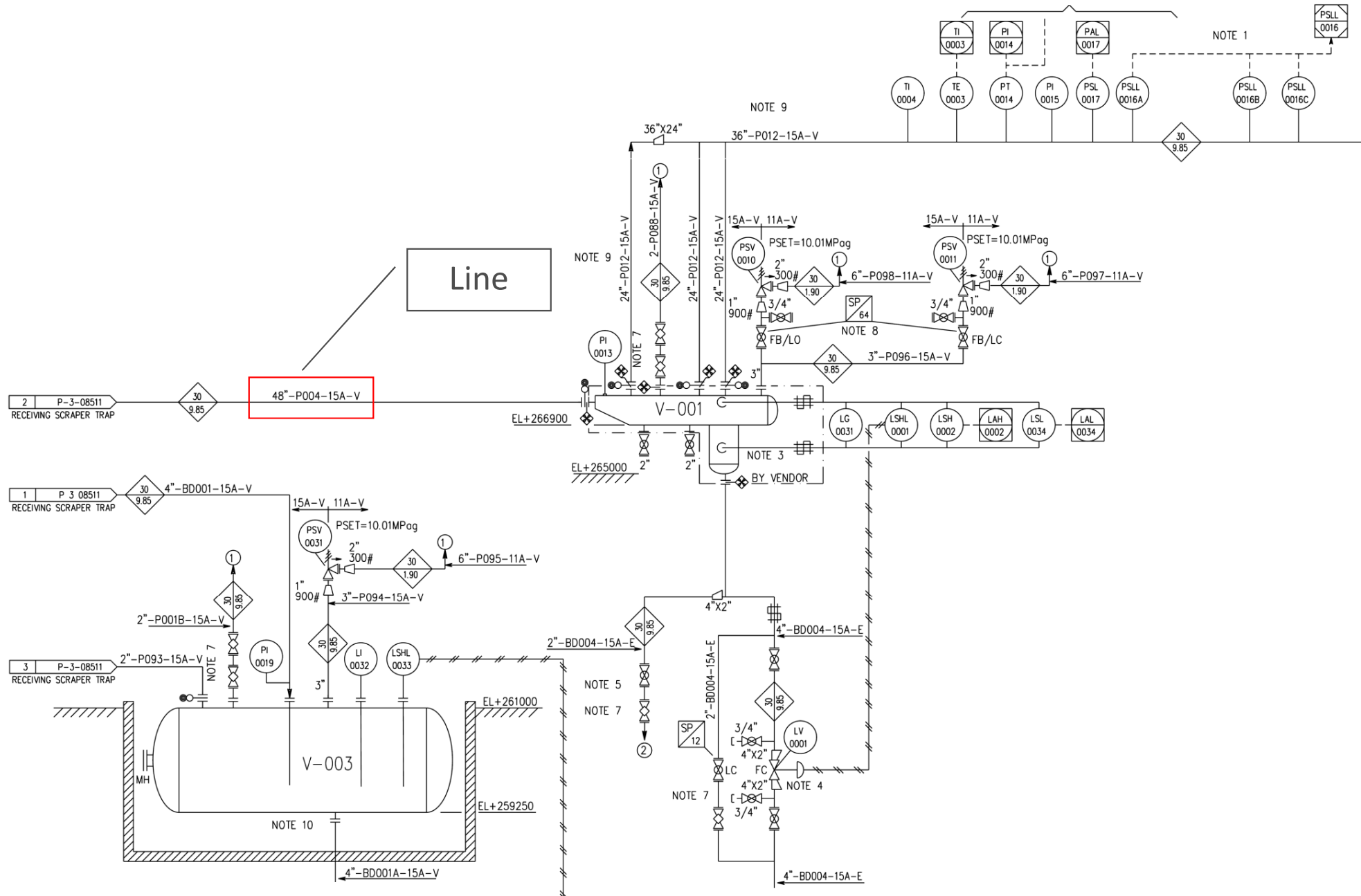
- MR : MIXED REFRIGERANT
- NR : NITROGEN REFRIGERANT
- PR : PROPANE REFRIGERANT

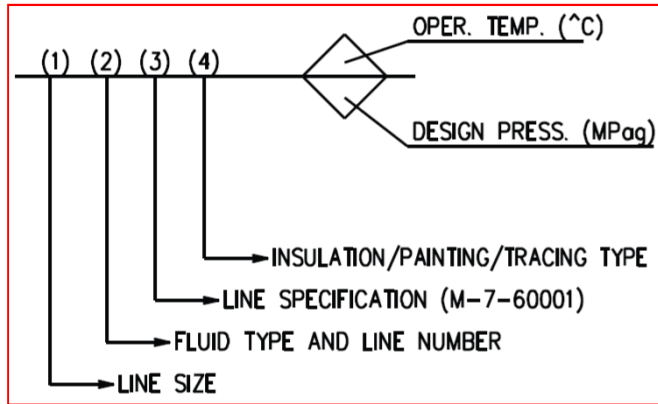
INSTRUMENT IDENTIFICATION

Y FC Z XXX B A

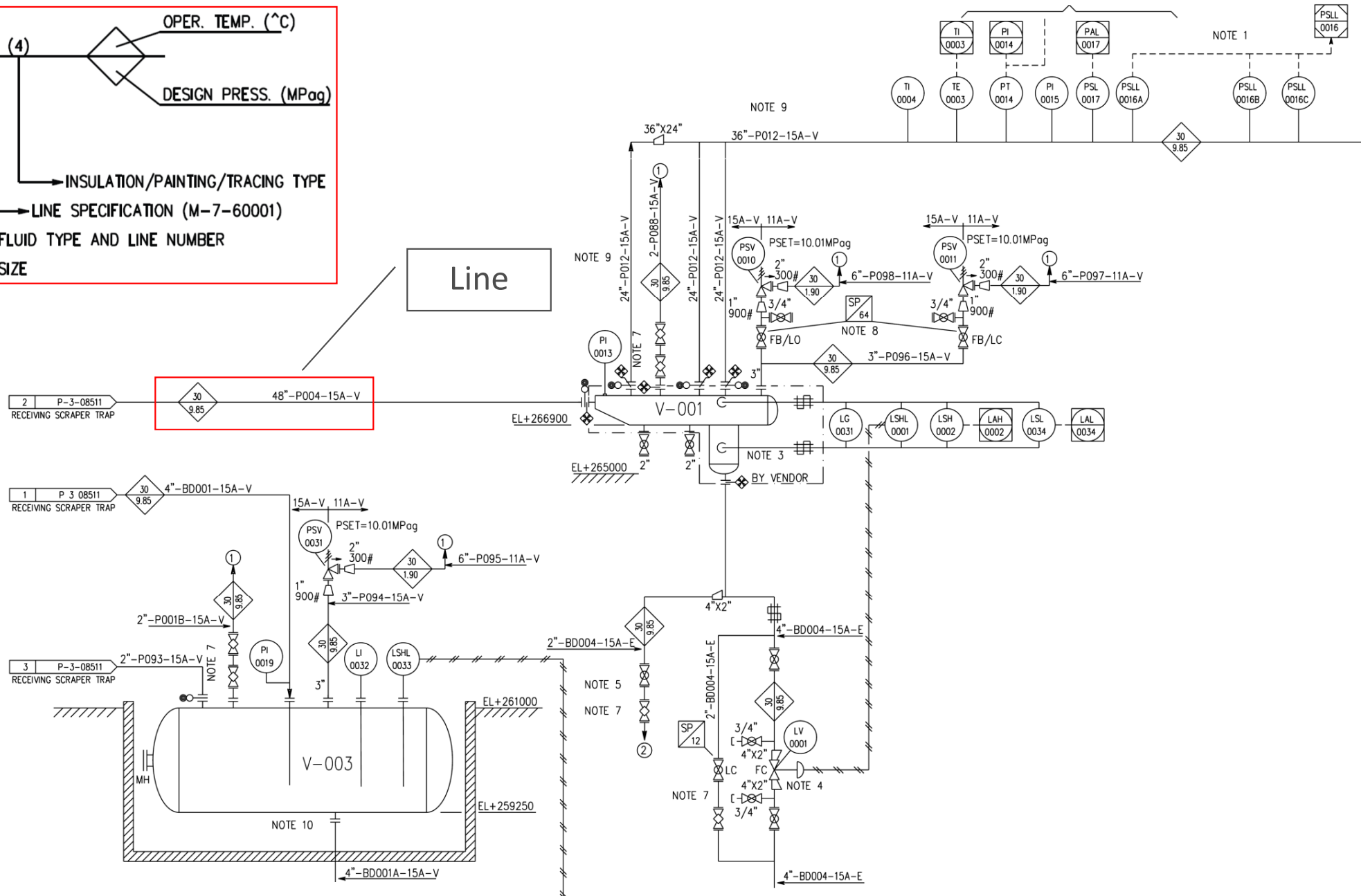


	FIRST LETTERS		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER				
BD	BLOWDOWN				
C				CONTROL	CLOSE
D		DIFFERENTIAL	DEVIATION		
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
ESD	EMERGENCY SHUTDOWN				
F	FLOW RATE	RATIO (FRACTION)			
G	FIRE & GAS		GAGE		
H	HAND				HIGH
HH					HIGH HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER				
K	SEQUENCE RELATED	TIME RATE OF CHANGE			
L	LEVEL		PILOT LAMP STATUS INDICATE		LOW
LL					LOW LOW
M					MIDDLE
MO	MOTOR OPERATED				
N					
O				ORIFICE	OPEN
P	PRESSURE VACUUM		POINT (TEST CONNECTION)		
PR	PRESSURE RELIEF				

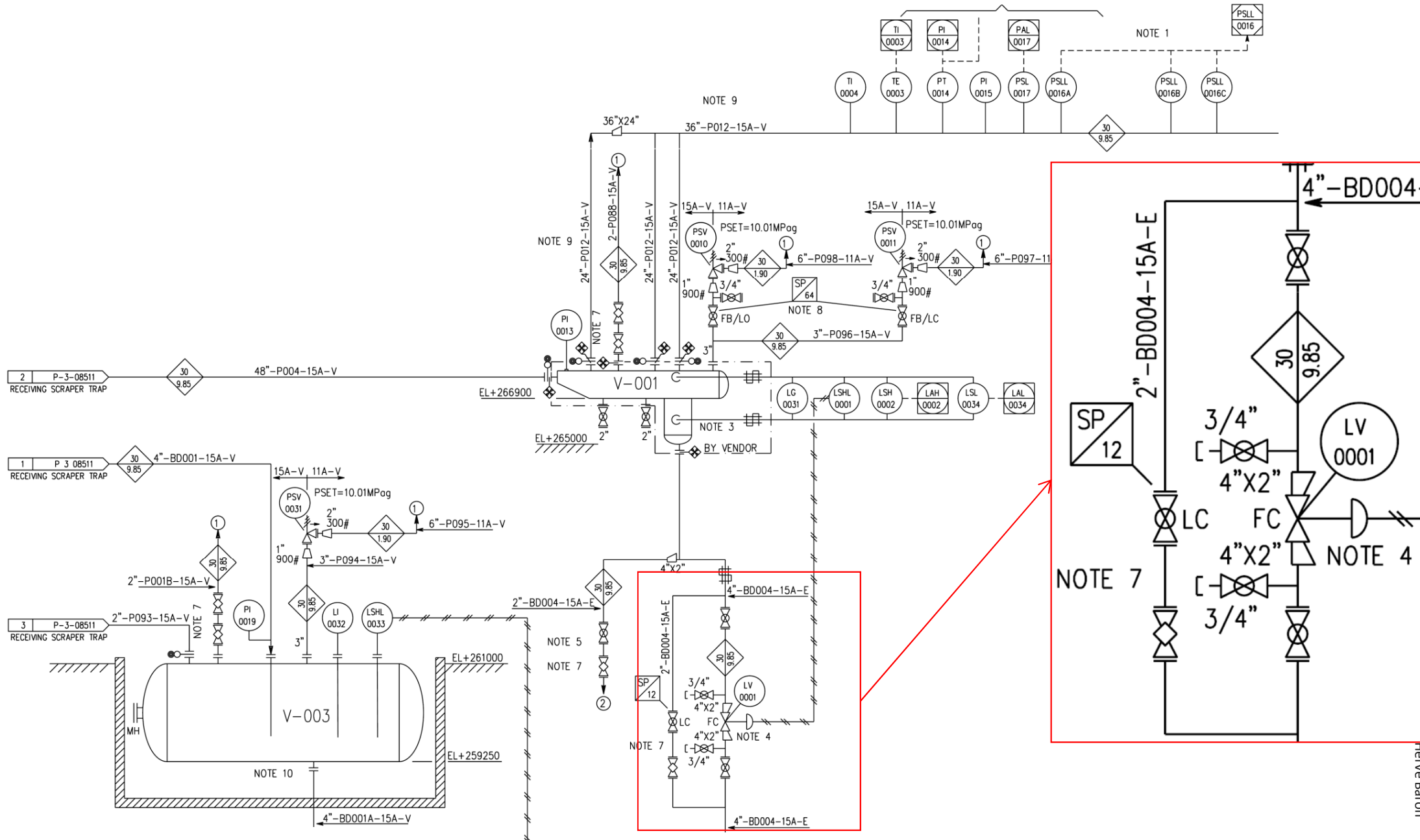




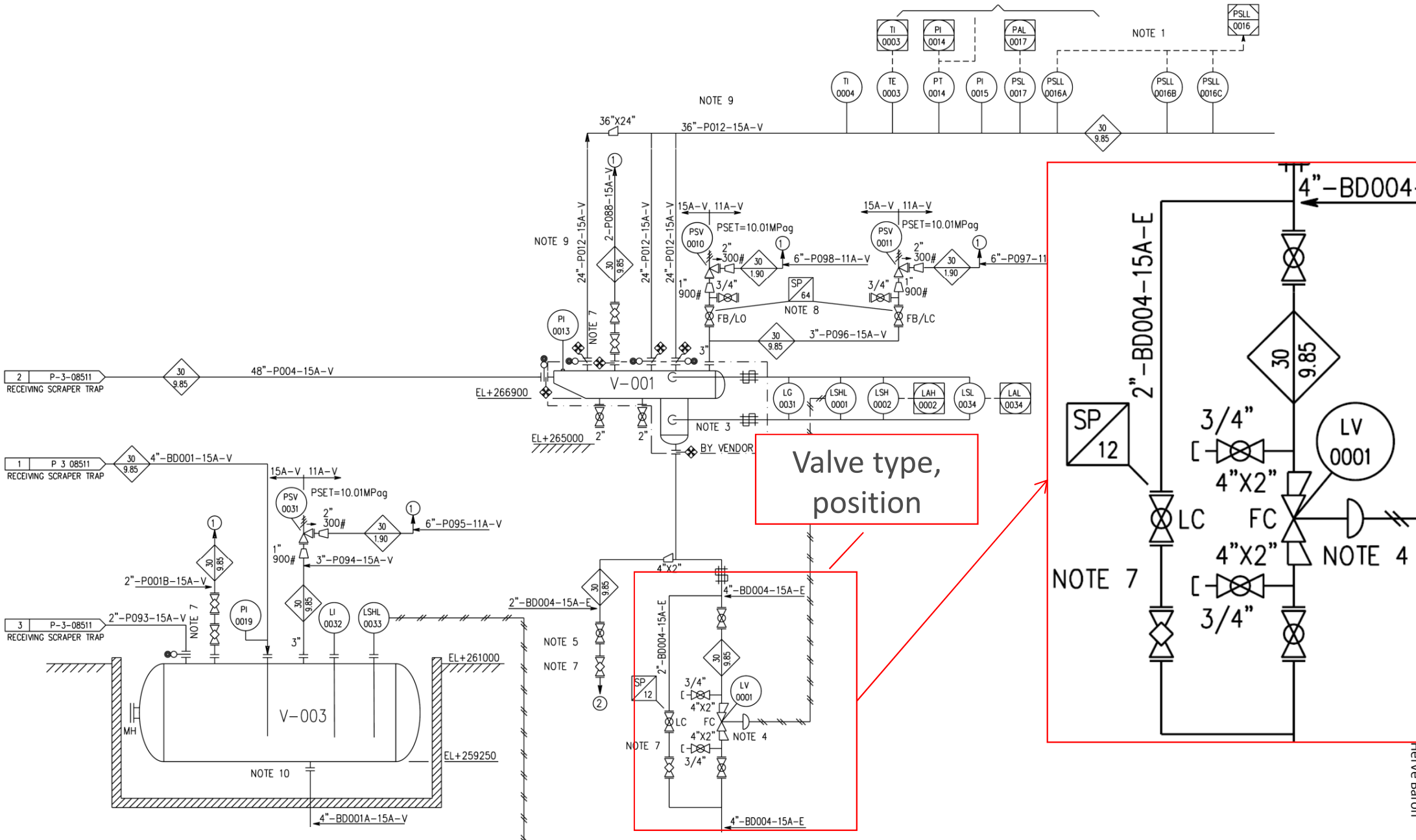
Line

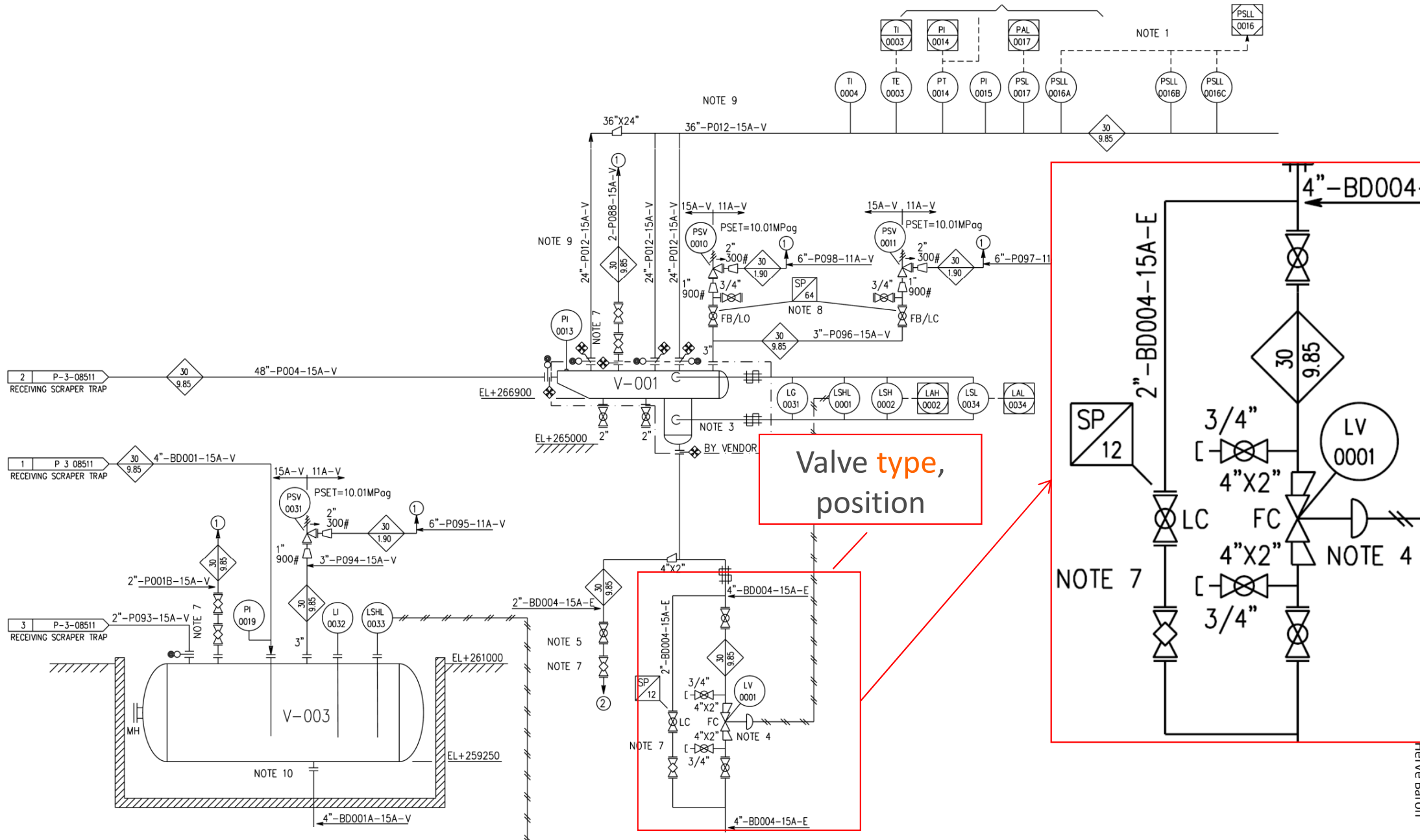


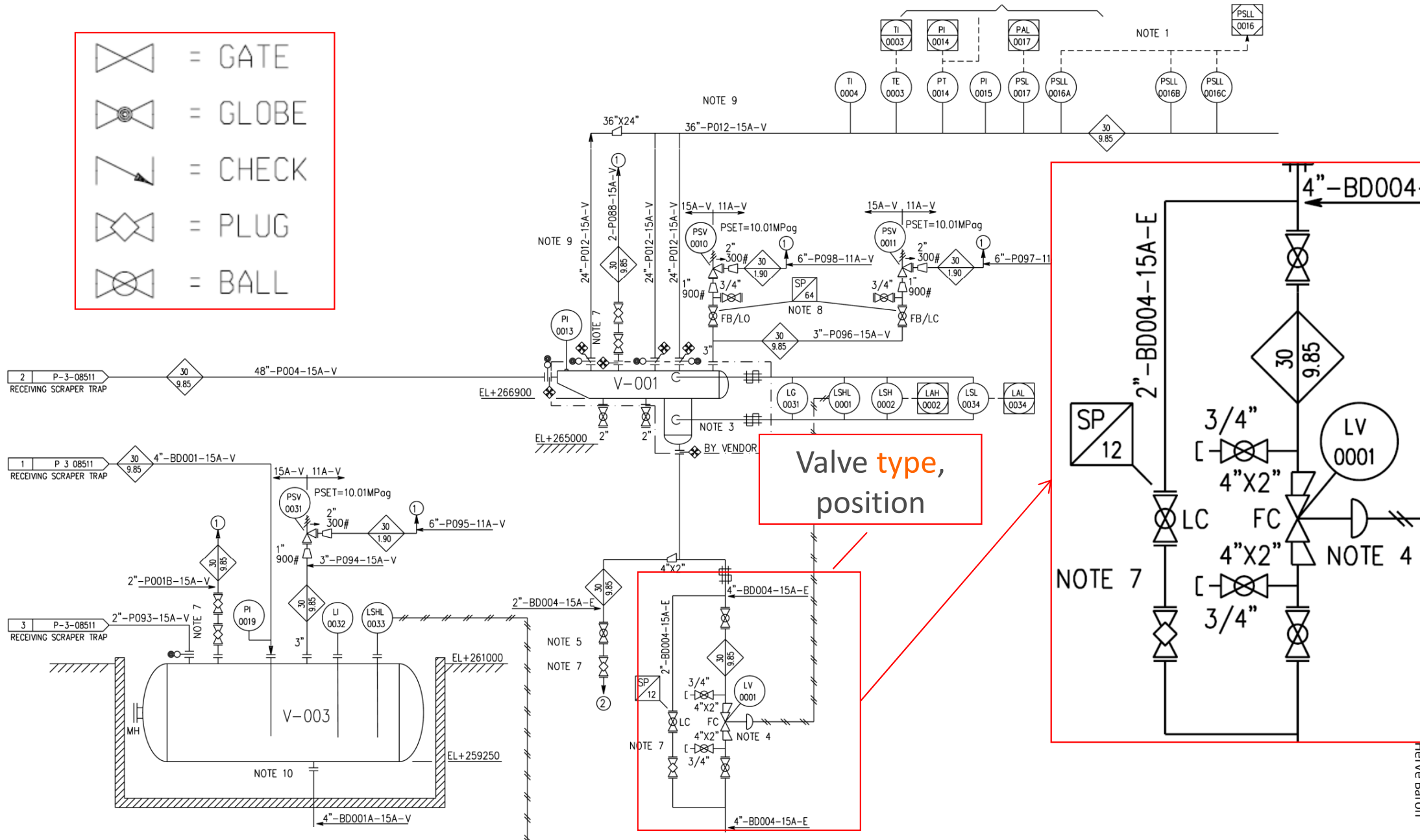
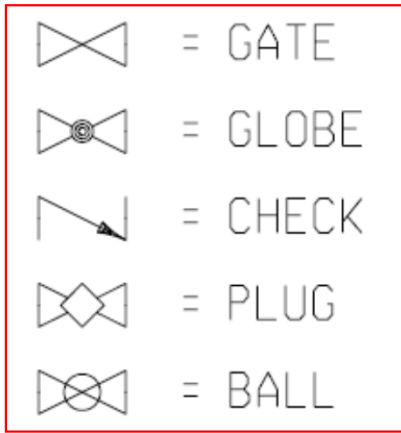
- Various types of P&IDs
 - Legend and Symbols
 - Identification and numbering system
 - General Symbols
 - Equipment symbols
 - Piping Symbols
 - Instrument Symbols



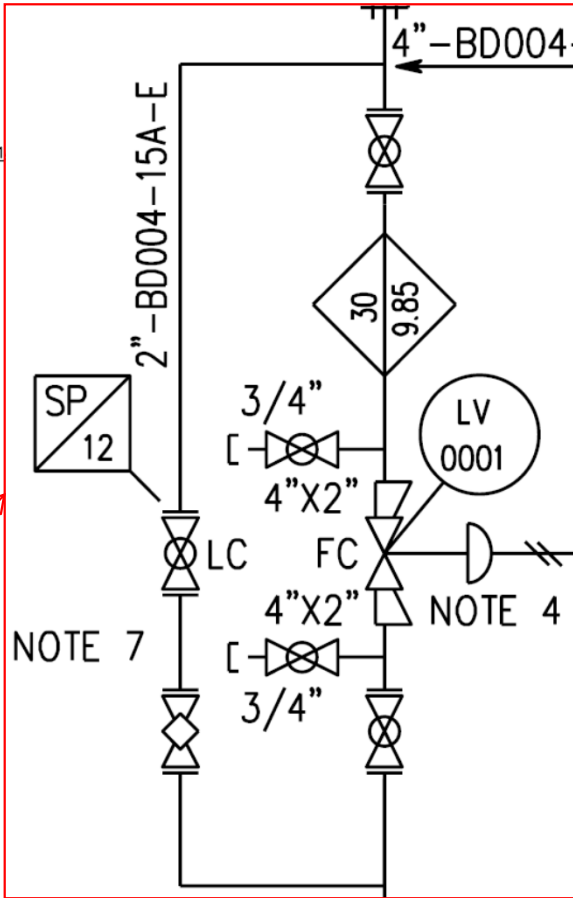
Piping & Instrumentation Diagrams (P&IDs)



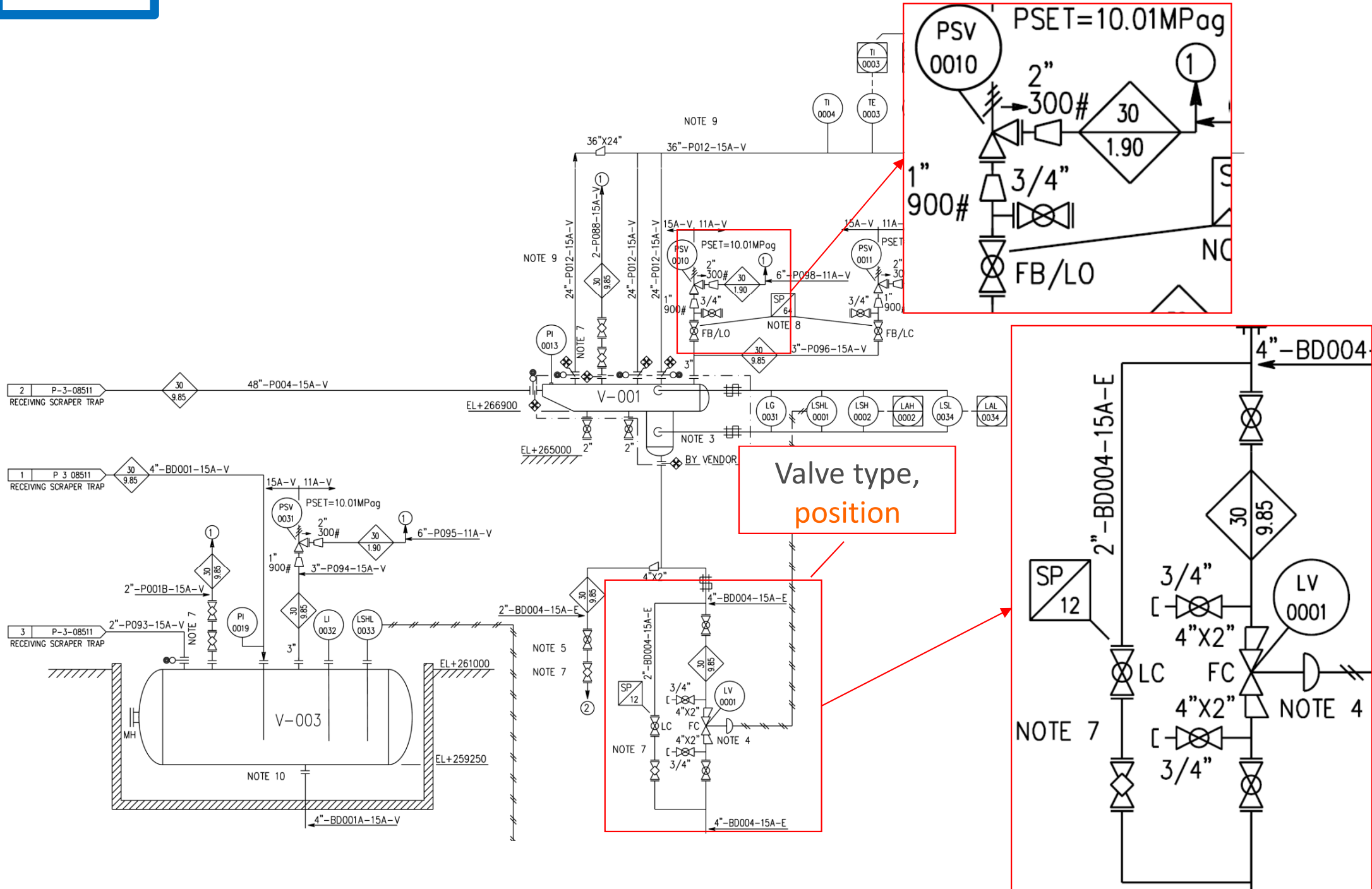




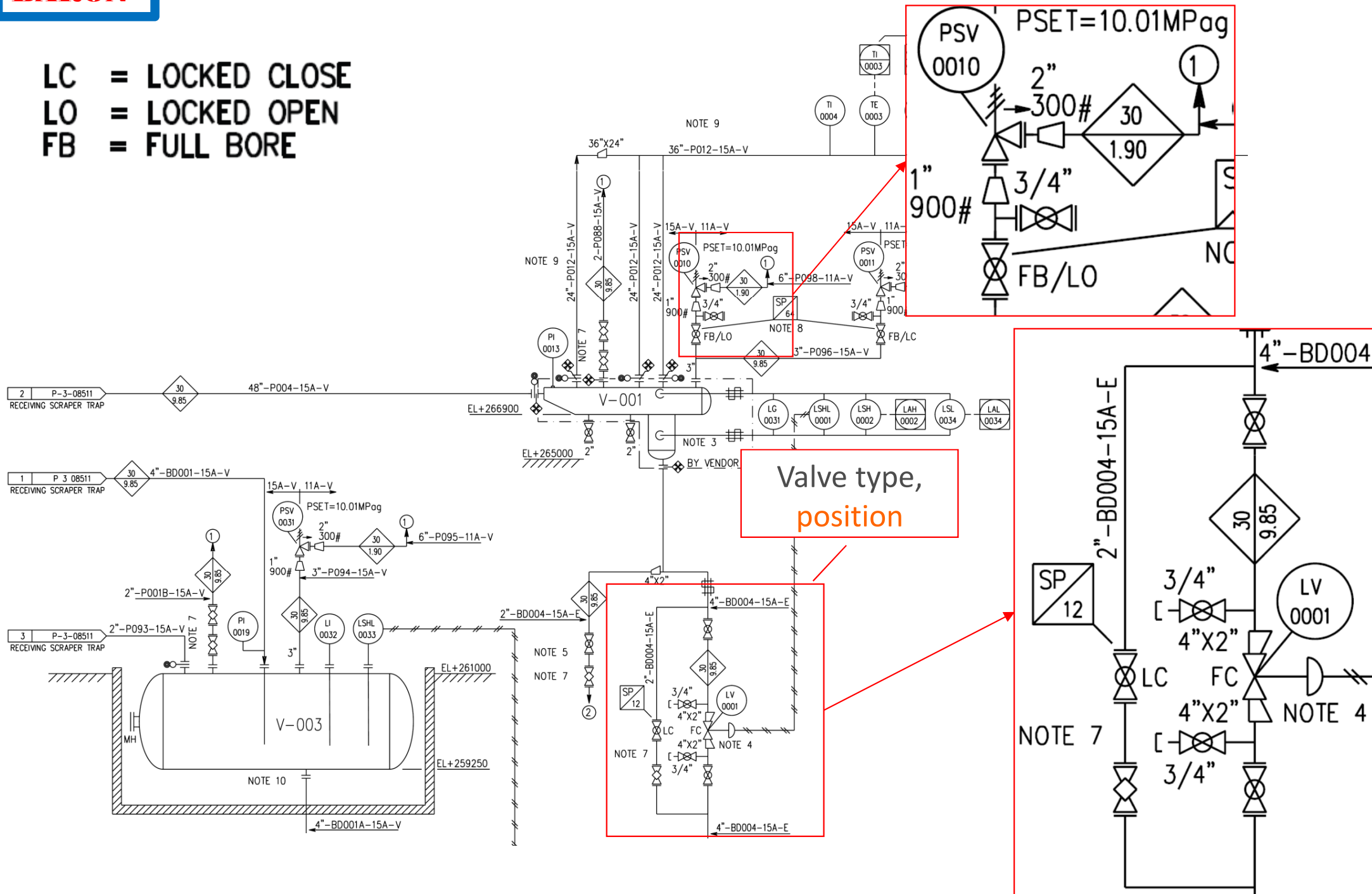
Valve type,
position

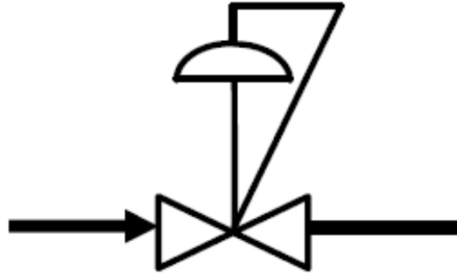


Piping & Instrumentation Diagrams (P&IDs)



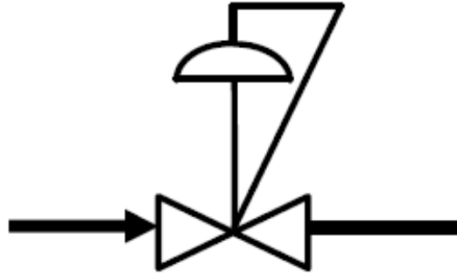
LC = LOCKED CLOSE
LO = LOCKED OPEN
FB = FULL BORE





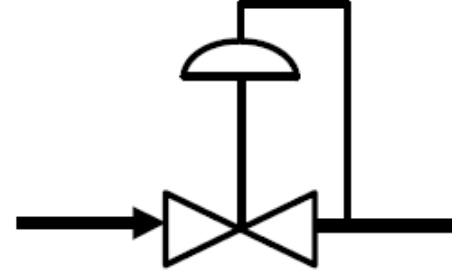
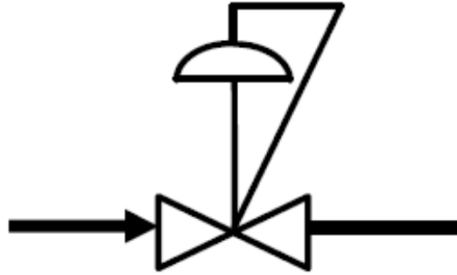
What is the function of this valve?

How is it called?

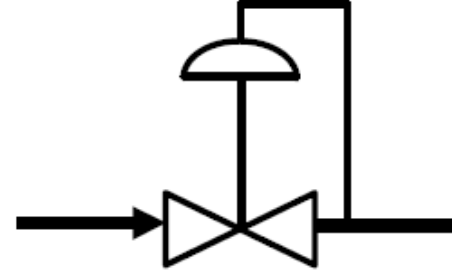
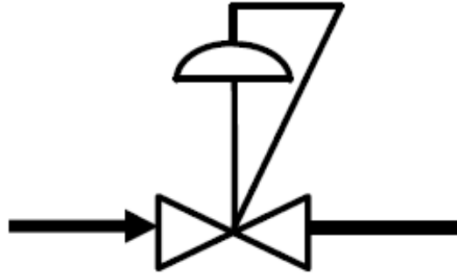


What is the function of this valve? To control the downstream pressure

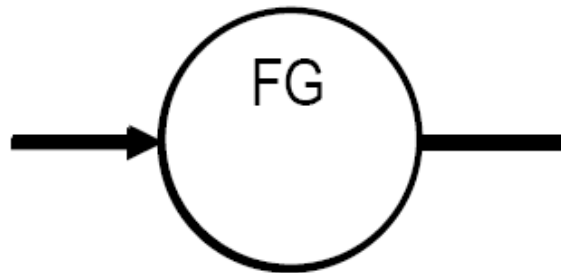
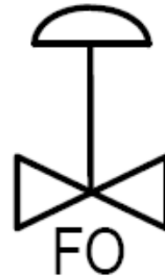
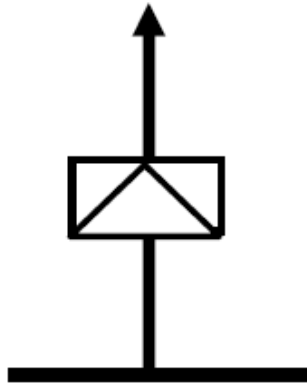
How is it called? Pressure reducing self regulated valve



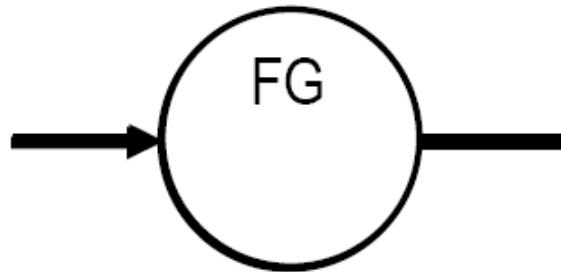
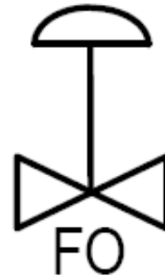
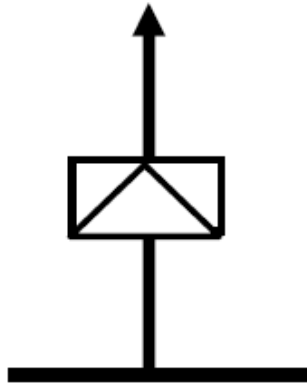
What is the difference between these 2 valves?



What is the difference between these 2 valves? The 2nd one has external pressure tap

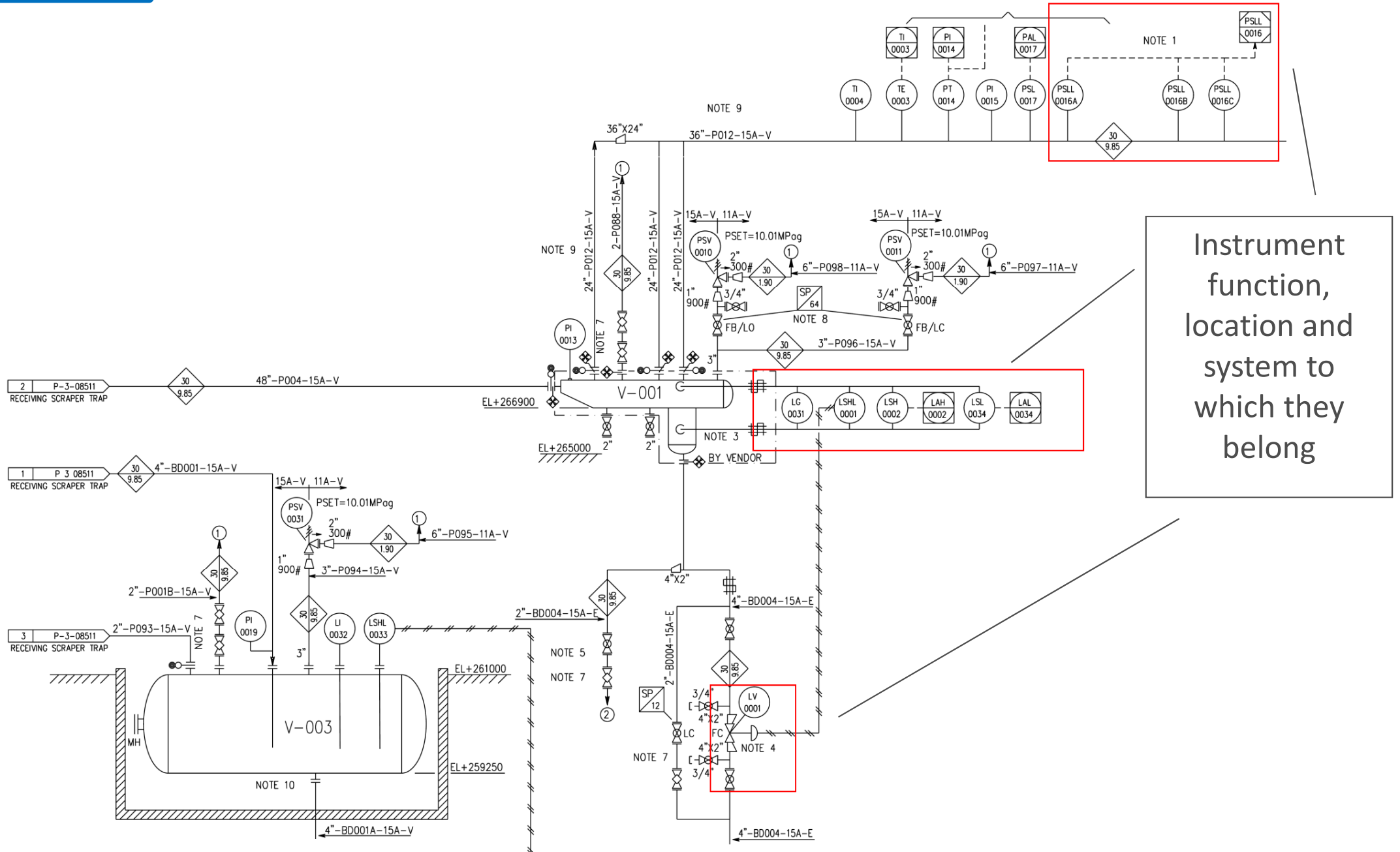


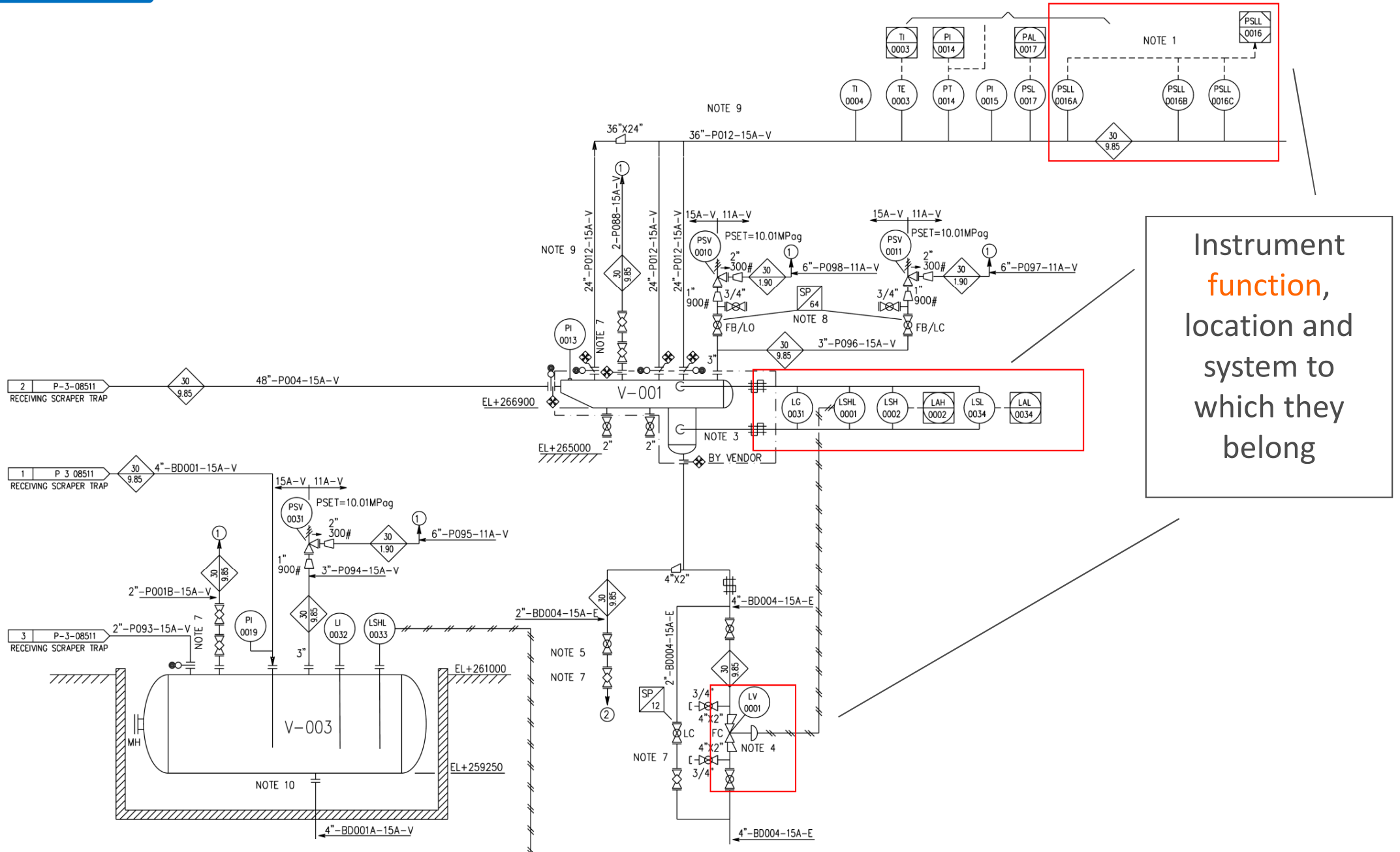
What do these symbols represent?



What do these symbols represent?

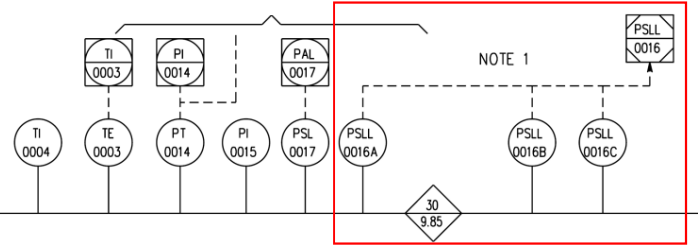
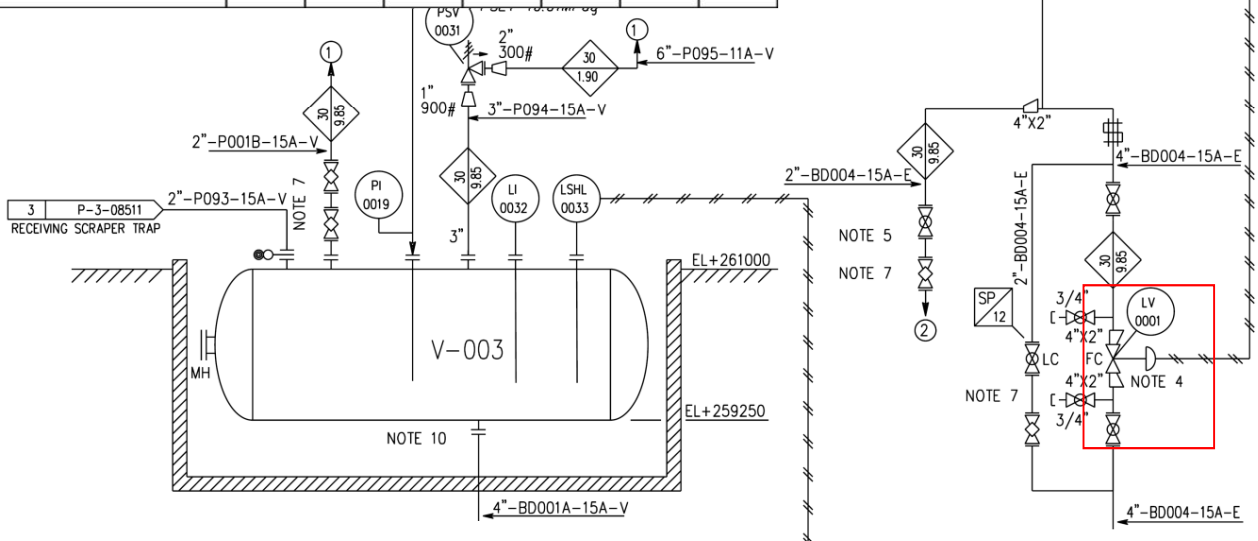
Rupture disk, Fail Open valve, Flow sight glass, Hydraulic signal





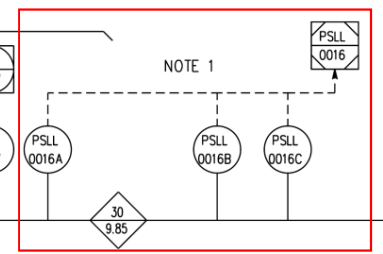
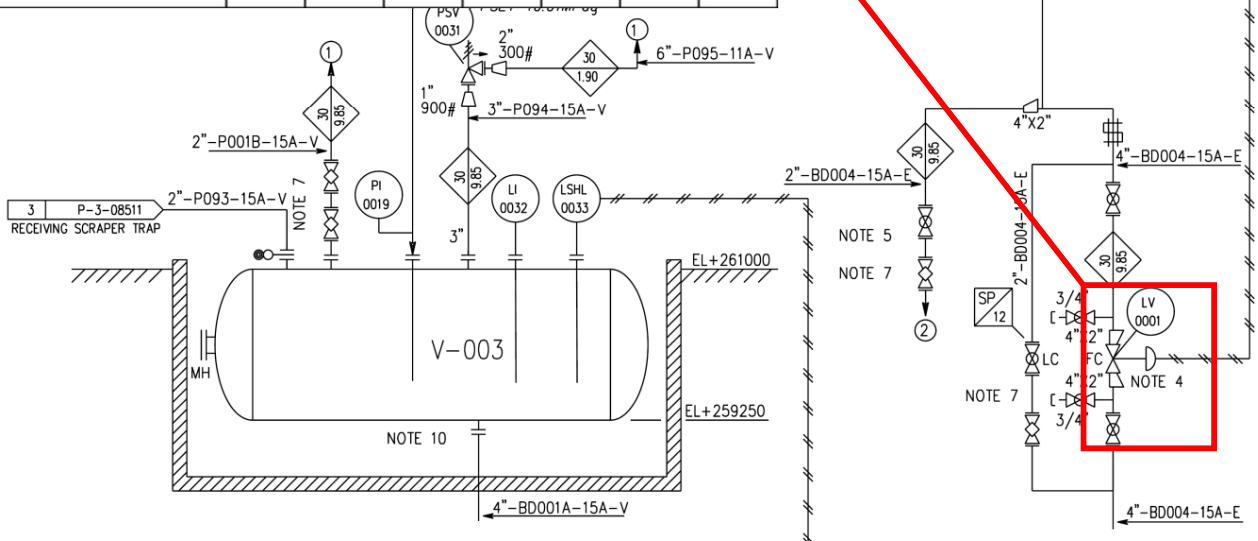
Instrument
function,
location and
system to
which they
belong

MEASURED VARIABLE \ INSTRUMENT FUNCTION	ANALYSIS	DENSITY	FLOW	HAND	LEVEL	MOTOR	PRESSURE
ALARM						MXA	
CONTROLLER	AC		FC	HC	LC		PC
CONTROL VALVE	AV		FV	HV HSV	LV		PV
SWITCH	AS		FS	HS	LS	MXS	PS
HIGH SWITCH	ASH		FSH		LSH		PSH
HIGH HIGH SWITCH	ASHH		FSHH		LSHH		PSHH
LOW SWITCH	ASL		FSL		LSL		PSL
LOW LOW SWITCH	ASLL		FSL		LSLL		PSLL

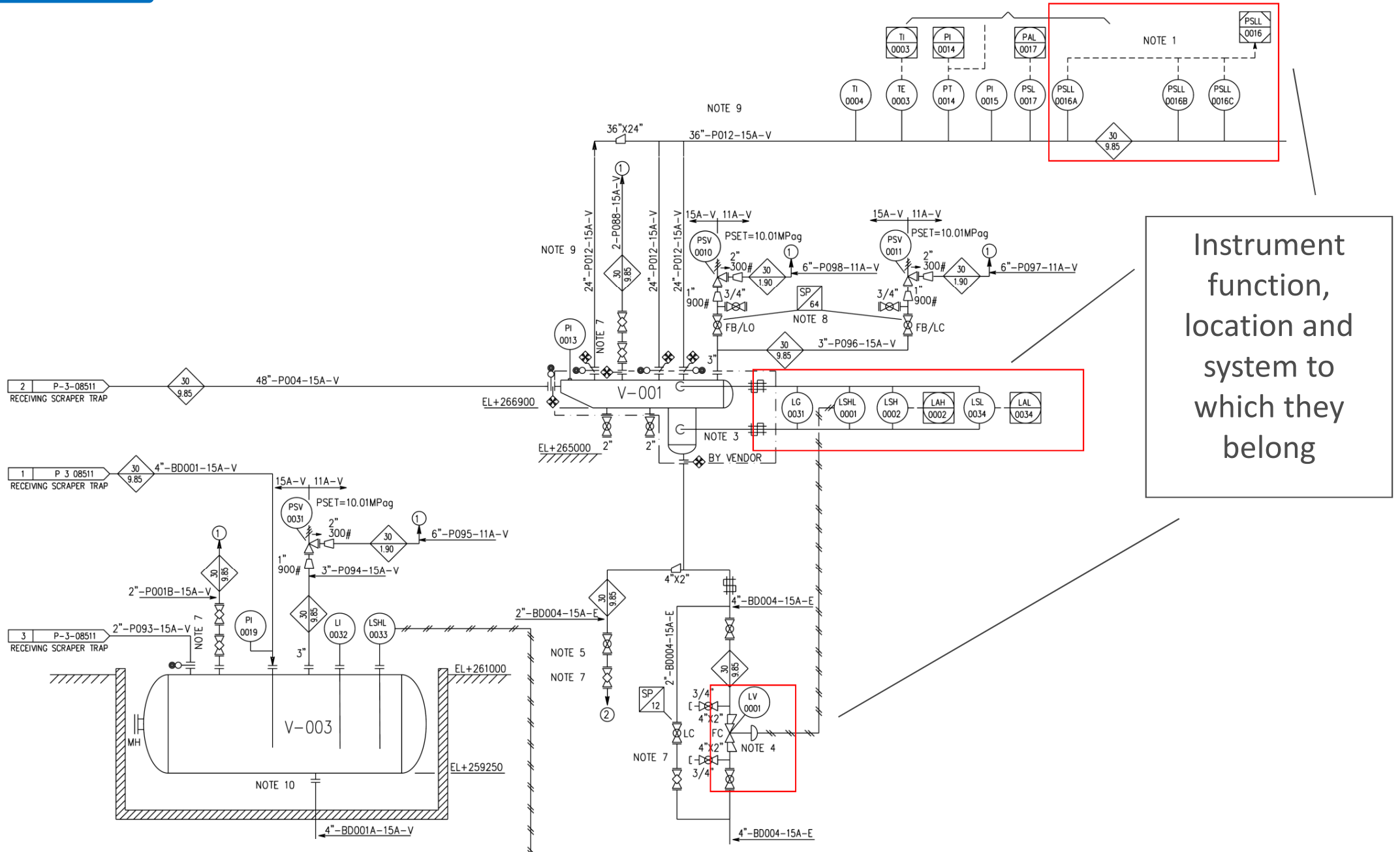


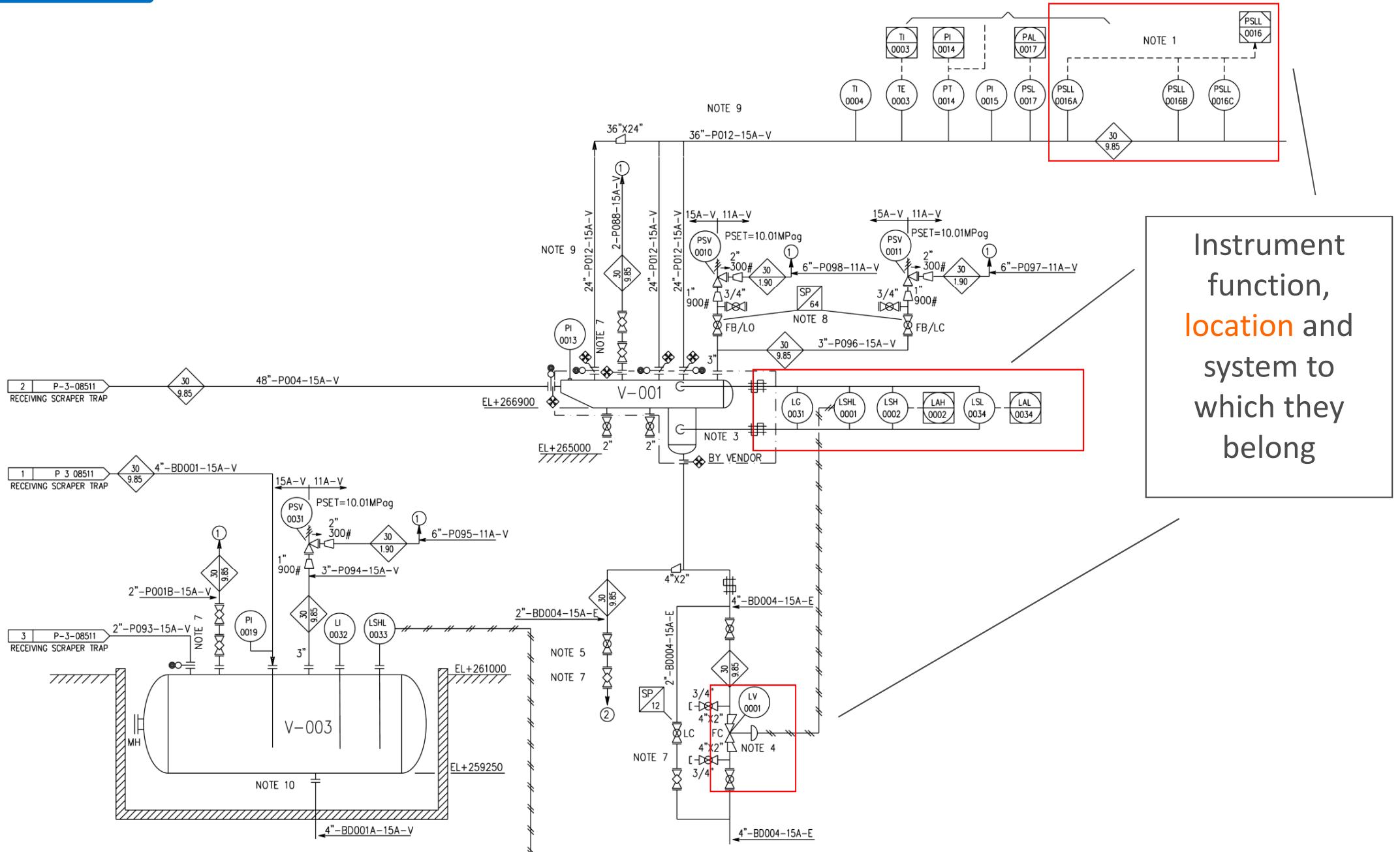
Instrument
function,
location and
system to
which they
belong

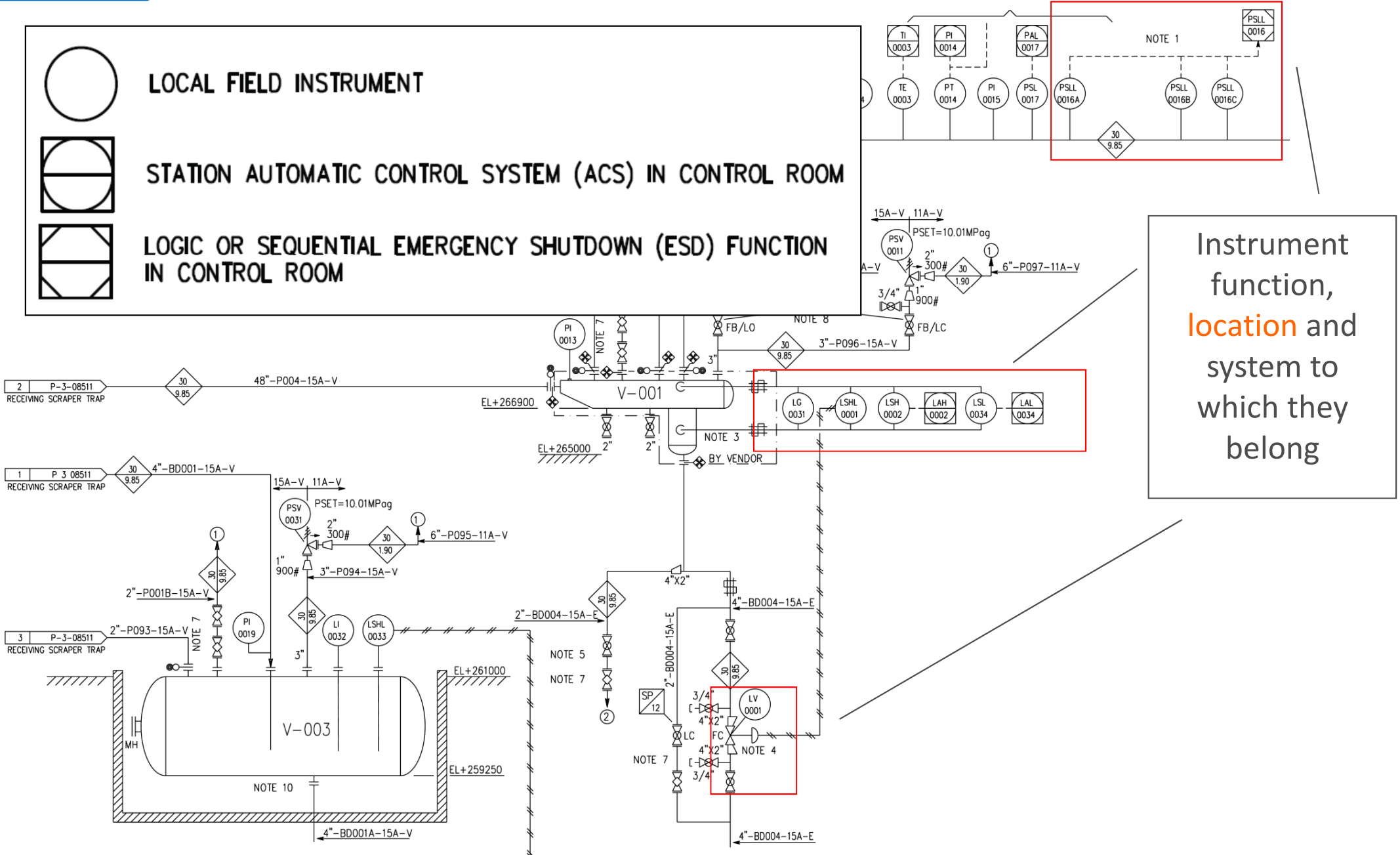
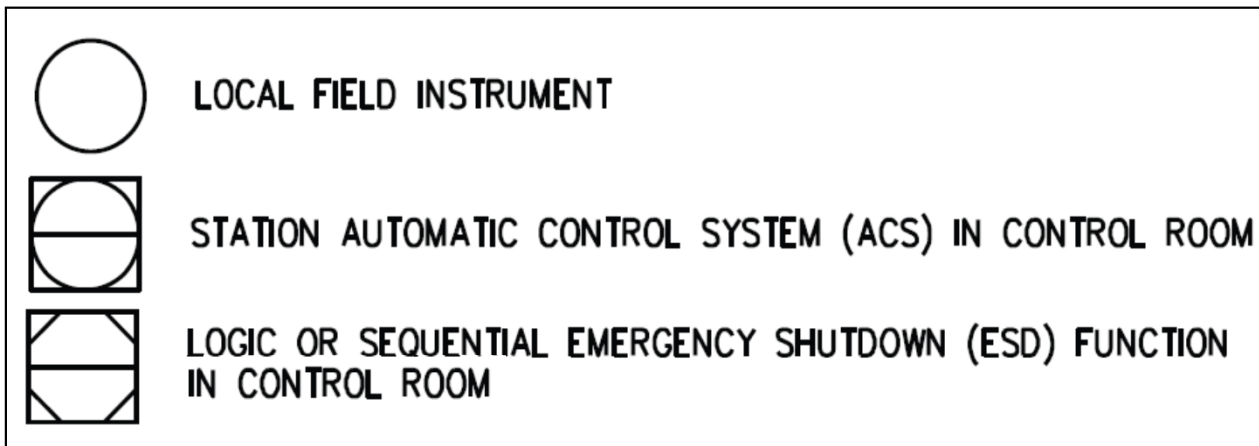
MEASURED VARIABLE \ INSTRUMENT FUNCTION	ANALYSIS	DENSITY	FLOW	HAND	LEVEL	MOTOR	PRESSURE
ALARM						MXA	
CONTROLLER	AC		FC	HC	LC		PC
CONTROL VALVE	AV		FV	HV HSV	LV		PV
SWITCH	AS		FS	HS	LS	MXS	PS
HIGH SWITCH	ASH		FSH		LSH		PSH
HIGH HIGH SWITCH	ASHH		FSHH		LSHH		PSHH
LOW SWITCH	ASL		FSL		LSL		PSL
LOW LOW SWITCH	ASLL		FSL		LSLL		PSLL



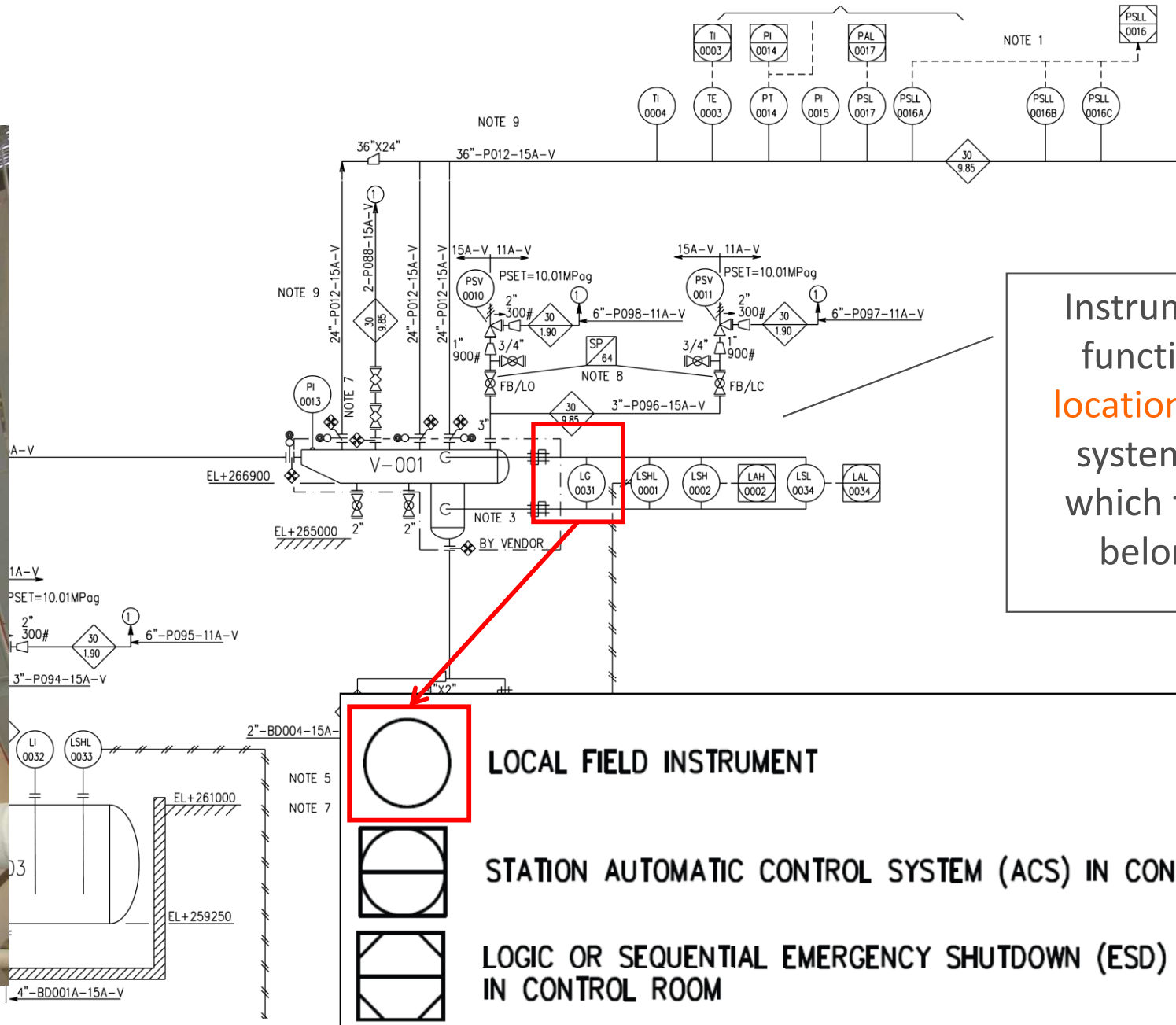
Instrument function, location and system to which they belong



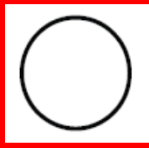

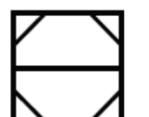


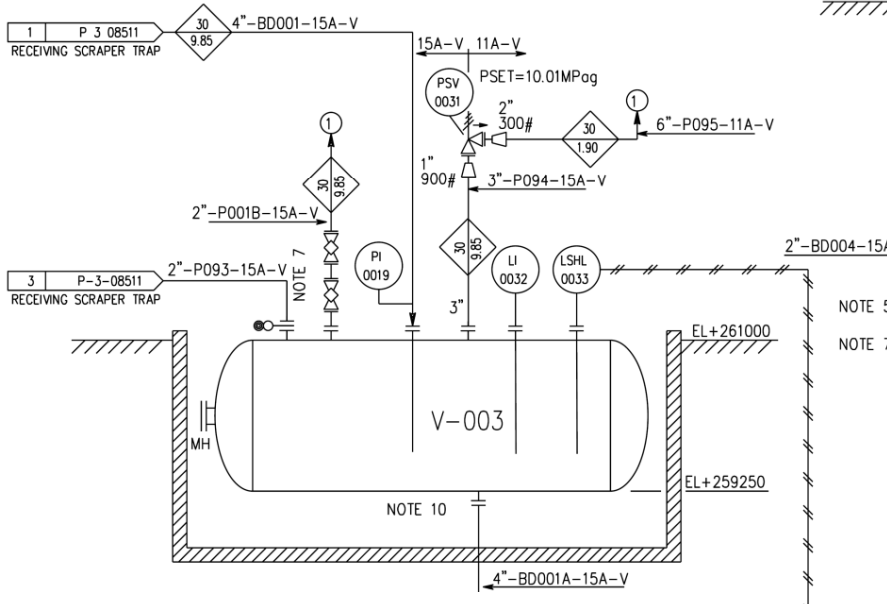
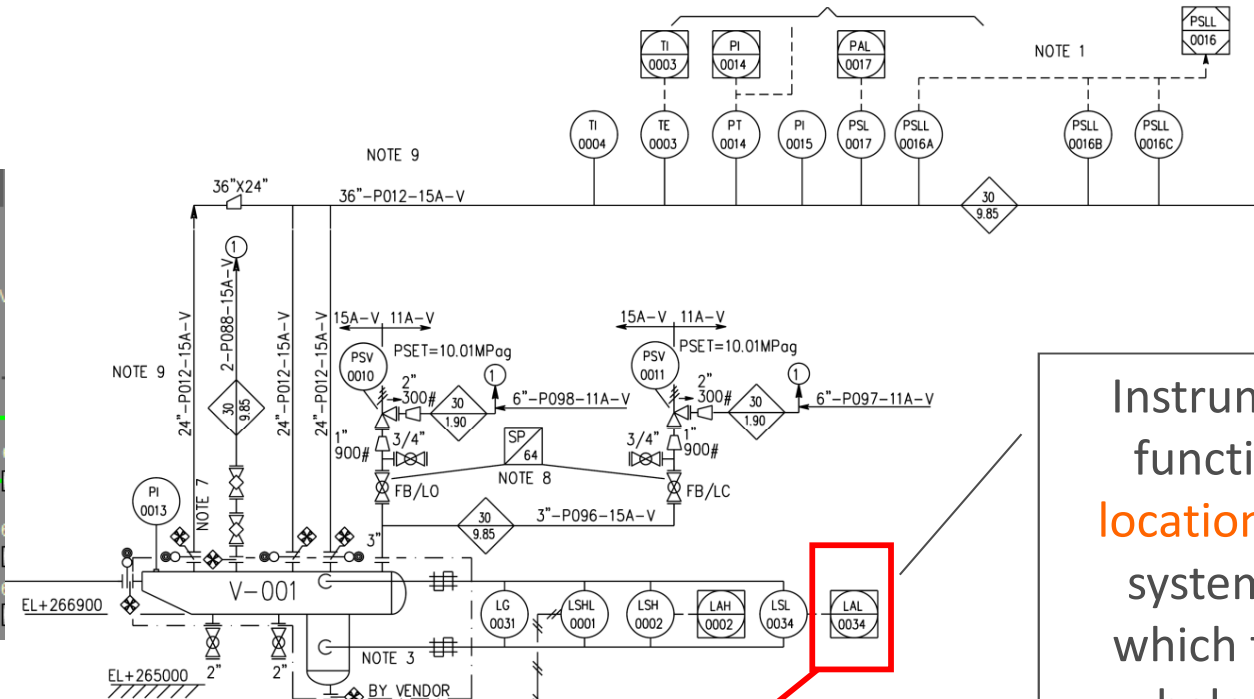
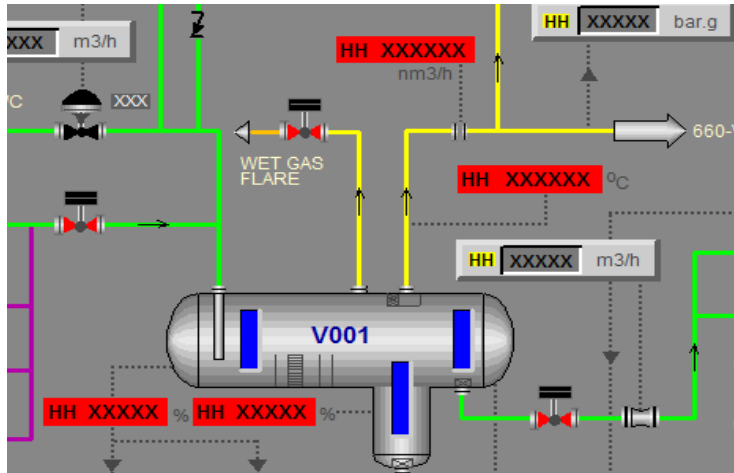


Instrument function, location and system to which they belong



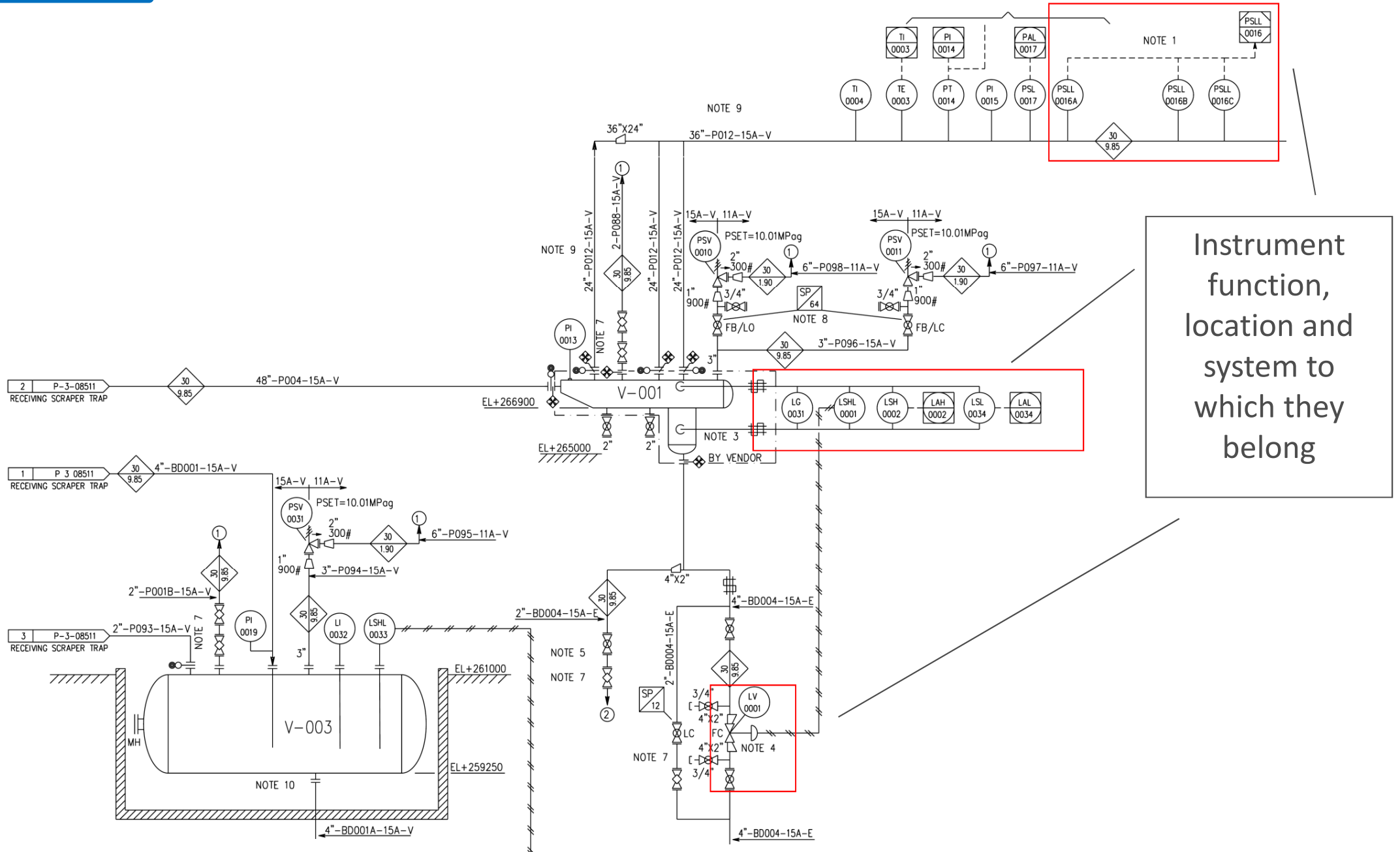
Instrument function, location and system to which they belong

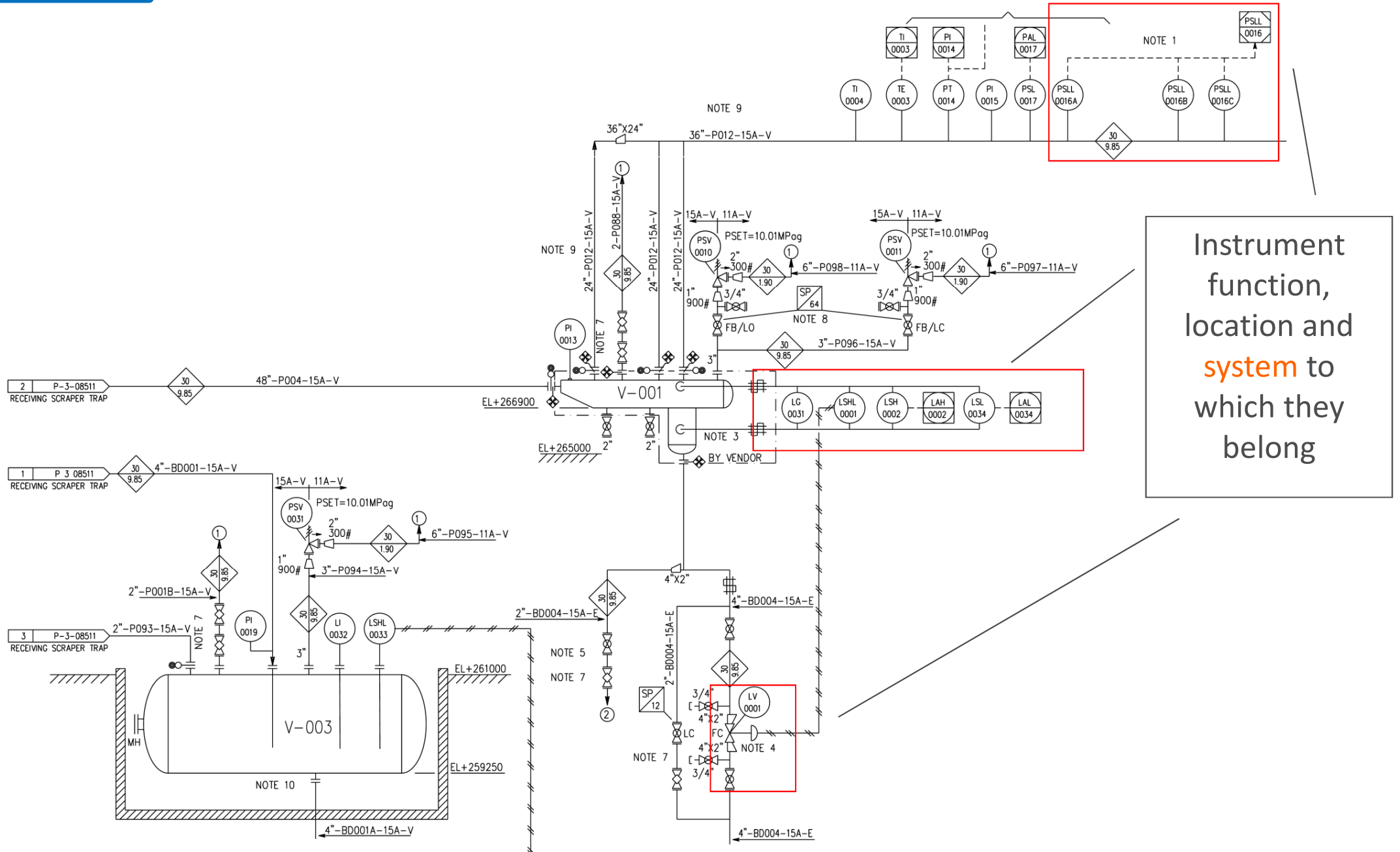
	LOCAL FIELD INSTRUMENT
	STATION AUTOMATIC CONTROL SYSTEM (ACS) IN CONTROL ROOM
	LOGIC OR SEQUENTIAL EMERGENCY SHUTDOWN (ESD) FUNCTION IN CONTROL ROOM

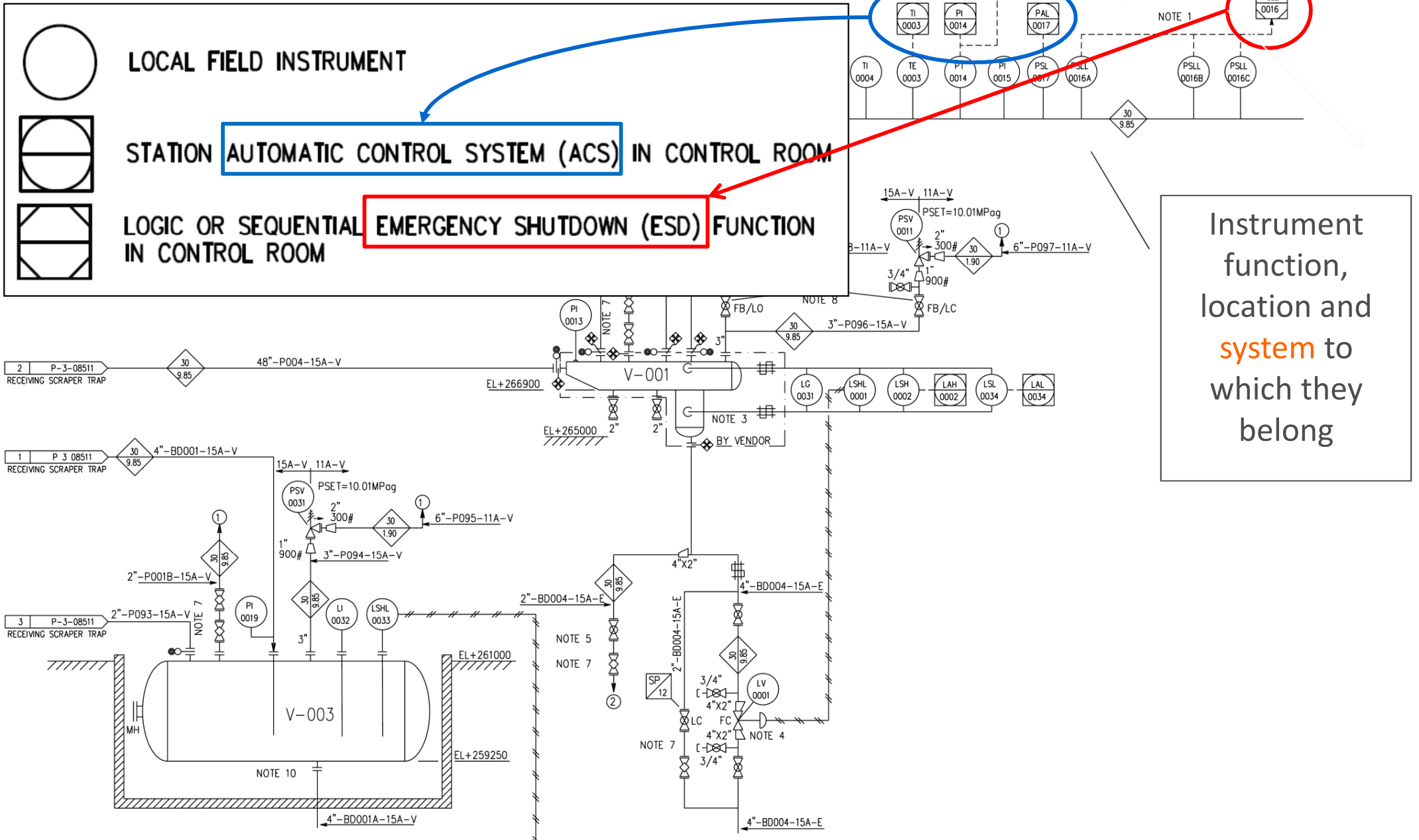


Instrument function, location and system to which they belong

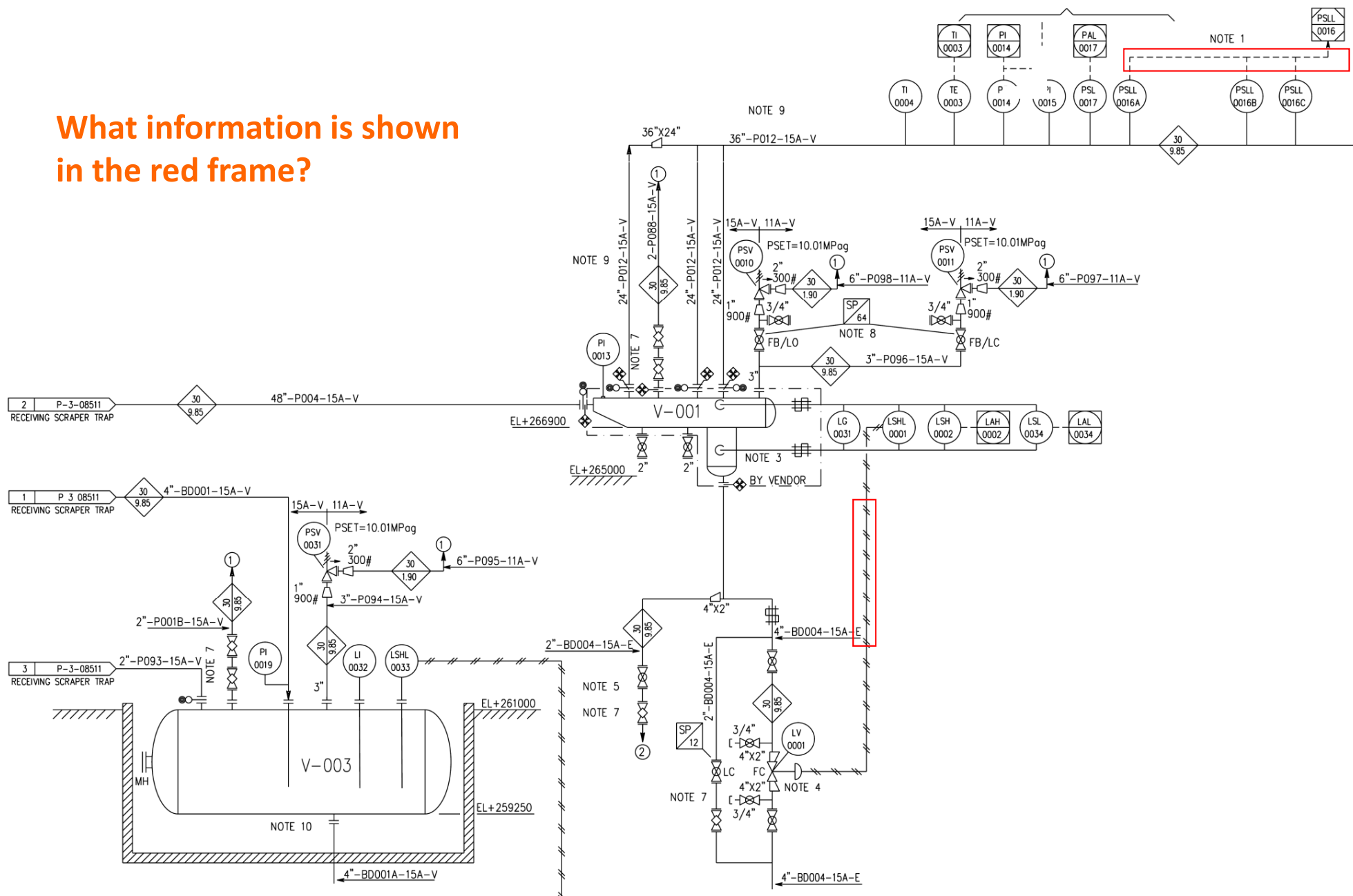
	LOCAL FIELD INSTRUMENT
	STATION AUTOMATIC CONTROL SYSTEM (ACS) IN CONTROL ROOM
	LOGIC OR SEQUENTIAL EMERGENCY SHUTDOWN (ESD) FUNCTION IN CONTROL ROOM






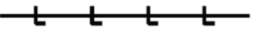
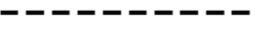
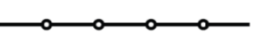


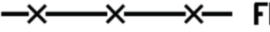


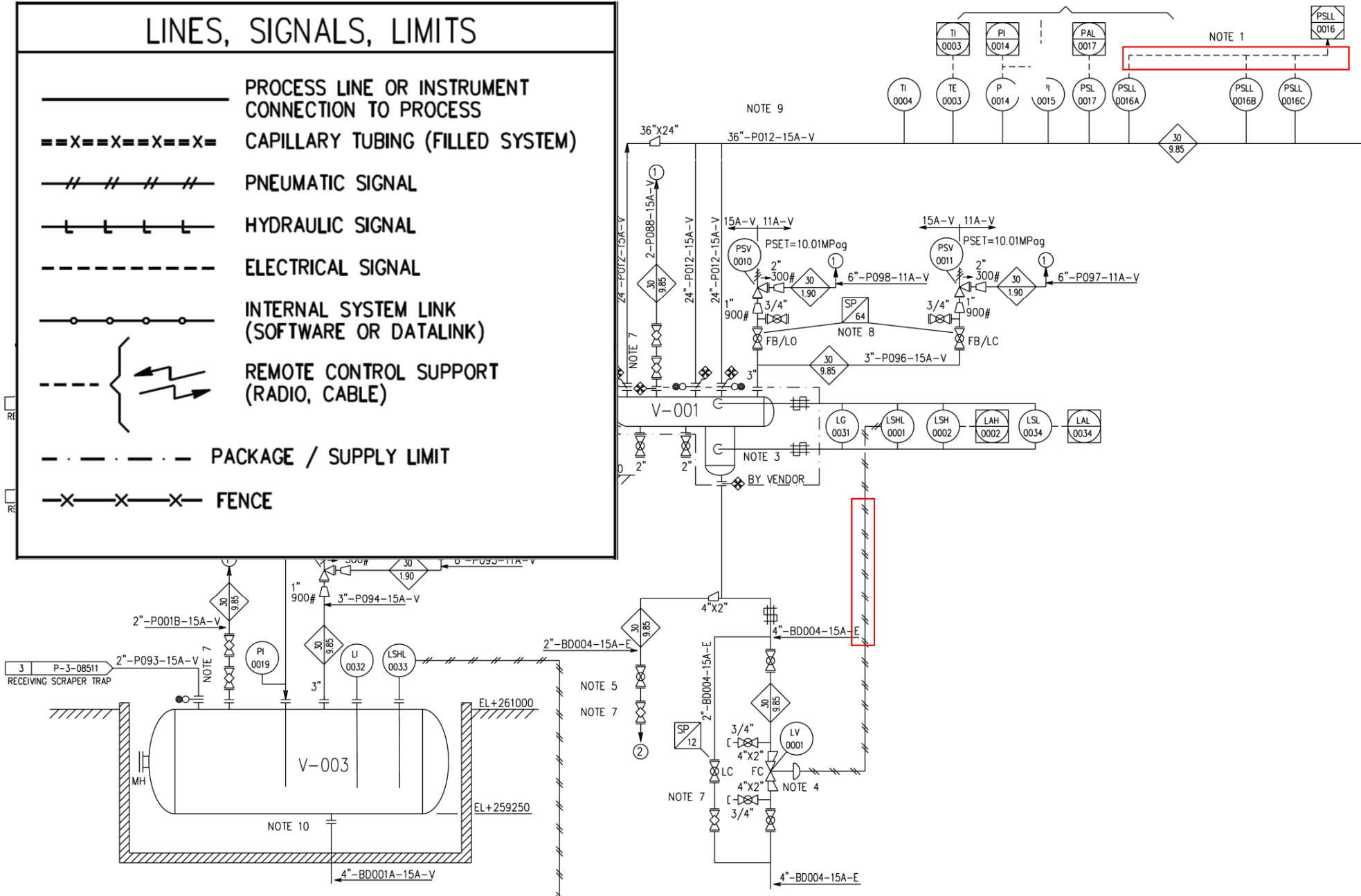


What information is shown in the red frame?

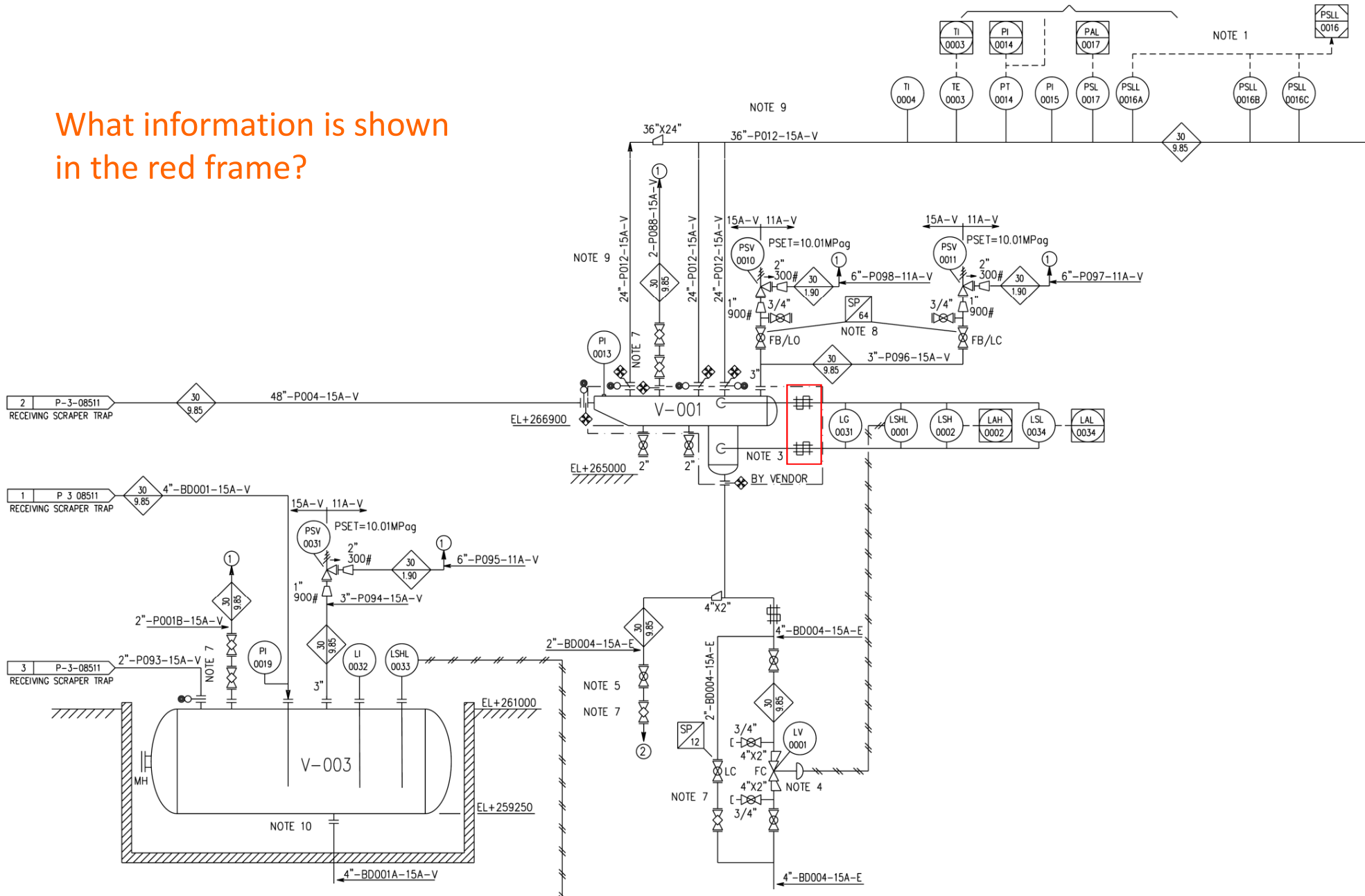


LINES, SIGNALS, LIMITS

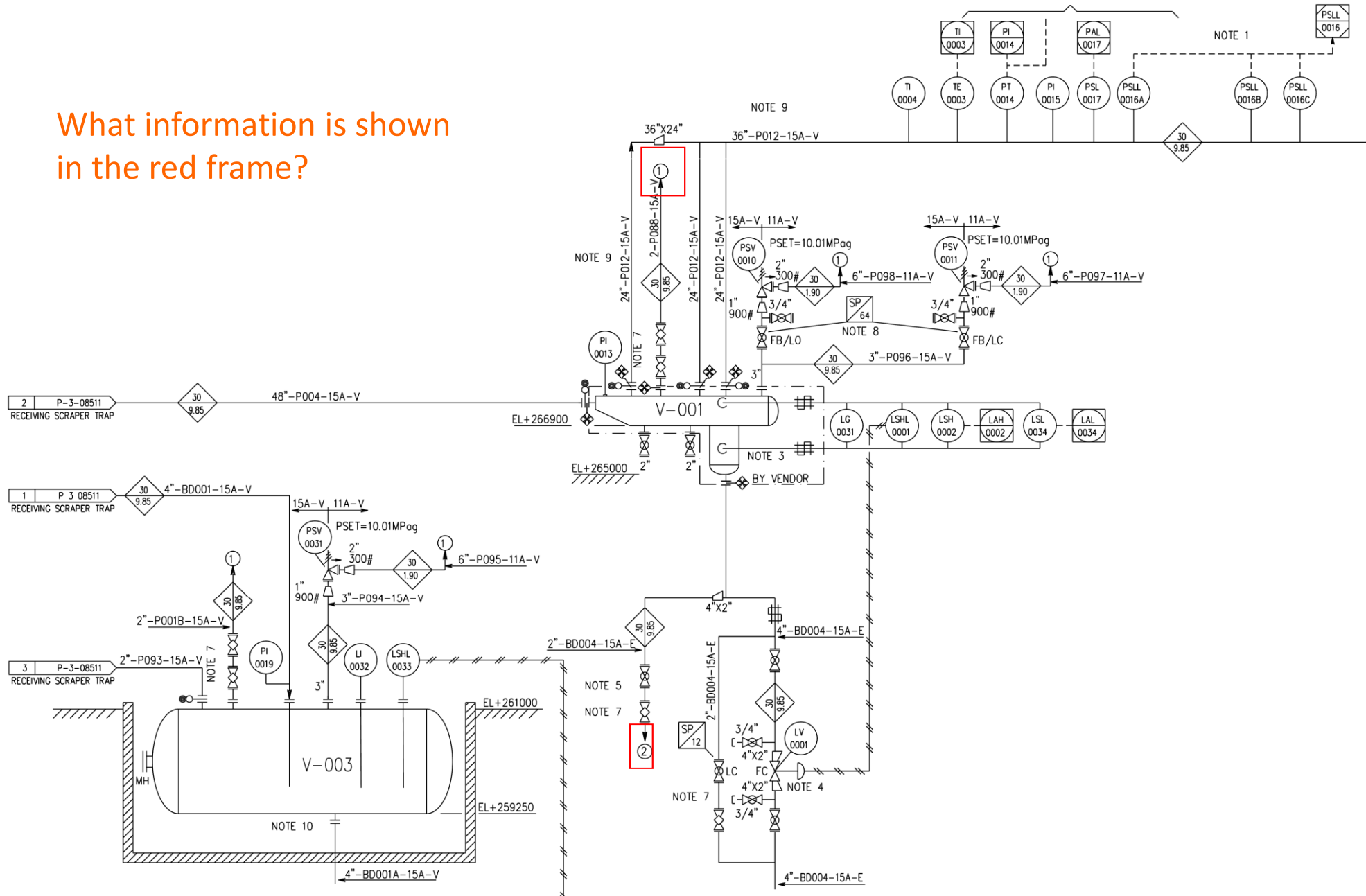
	PROCESS LINE OR INSTRUMENT CONNECTION TO PROCESS
	CAPILLARY TUBING (FILLED SYSTEM)
	PNEUMATIC SIGNAL
	HYDRAULIC SIGNAL
	ELECTRICAL SIGNAL
	INTERNAL SYSTEM LINK (SOFTWARE OR DATALINK)
	REMOTE CONTROL SUPPORT (RADIO, CABLE)
	PACKAGE / SUPPLY LIMIT
	FENCE



What information is shown in the red frame?

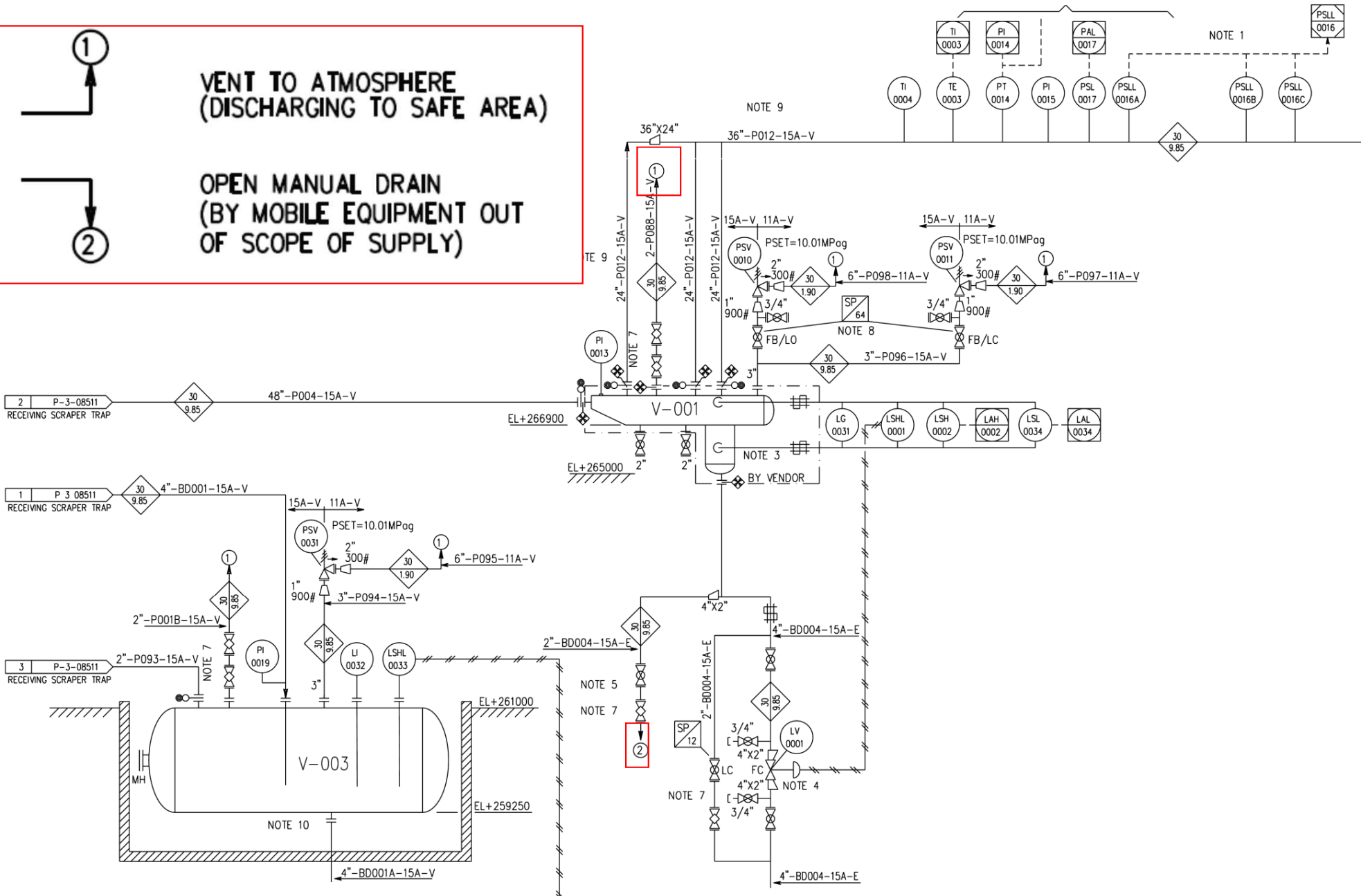


What information is shown in the red frame?

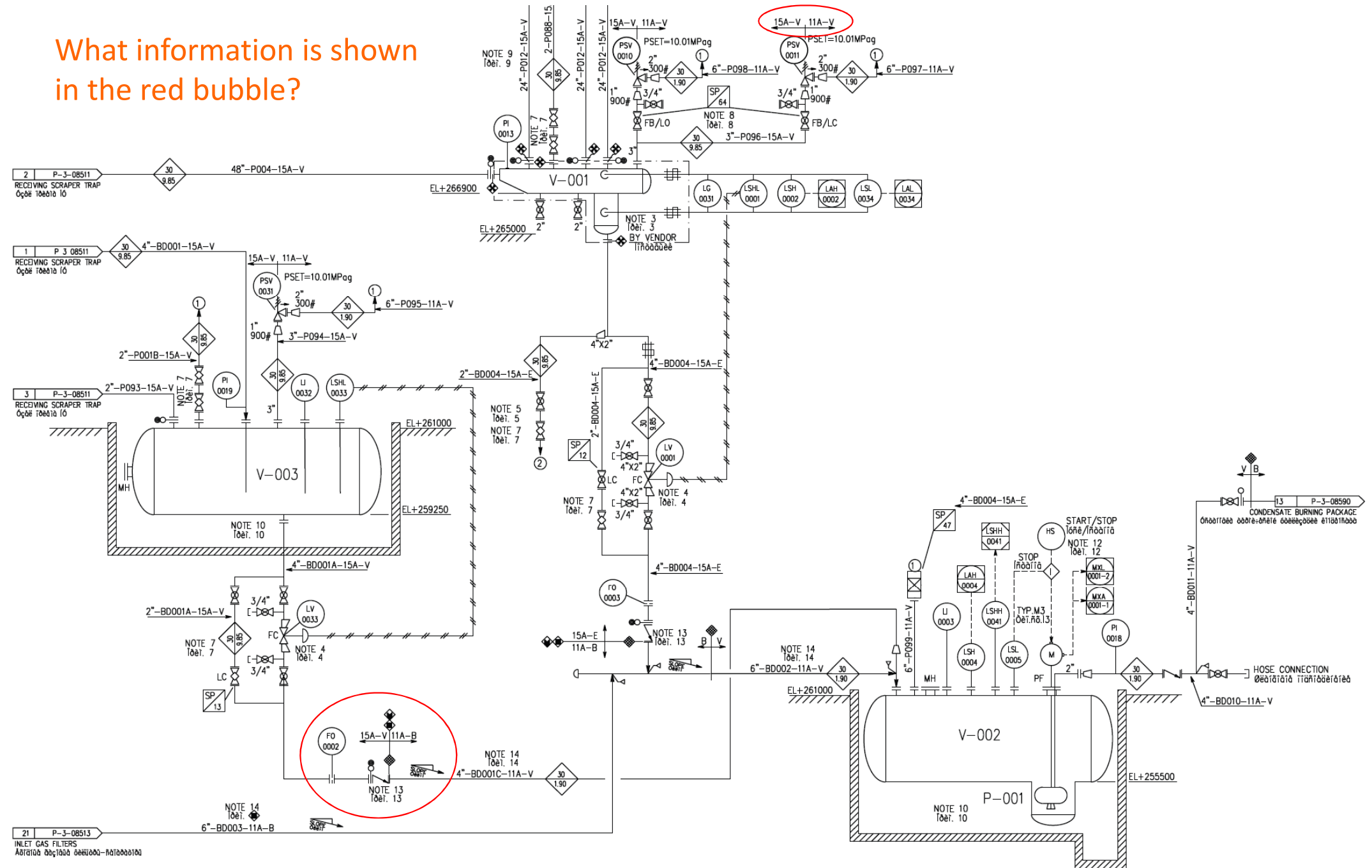


**VENT TO ATMOSPHERE
(DISCHARGING TO SAFE AREA)**

**OPEN MANUAL DRAIN
(BY MOBILE EQUIPMENT OUT
OF SCOPE OF SUPPLY)**



What information is shown in the red bubble?

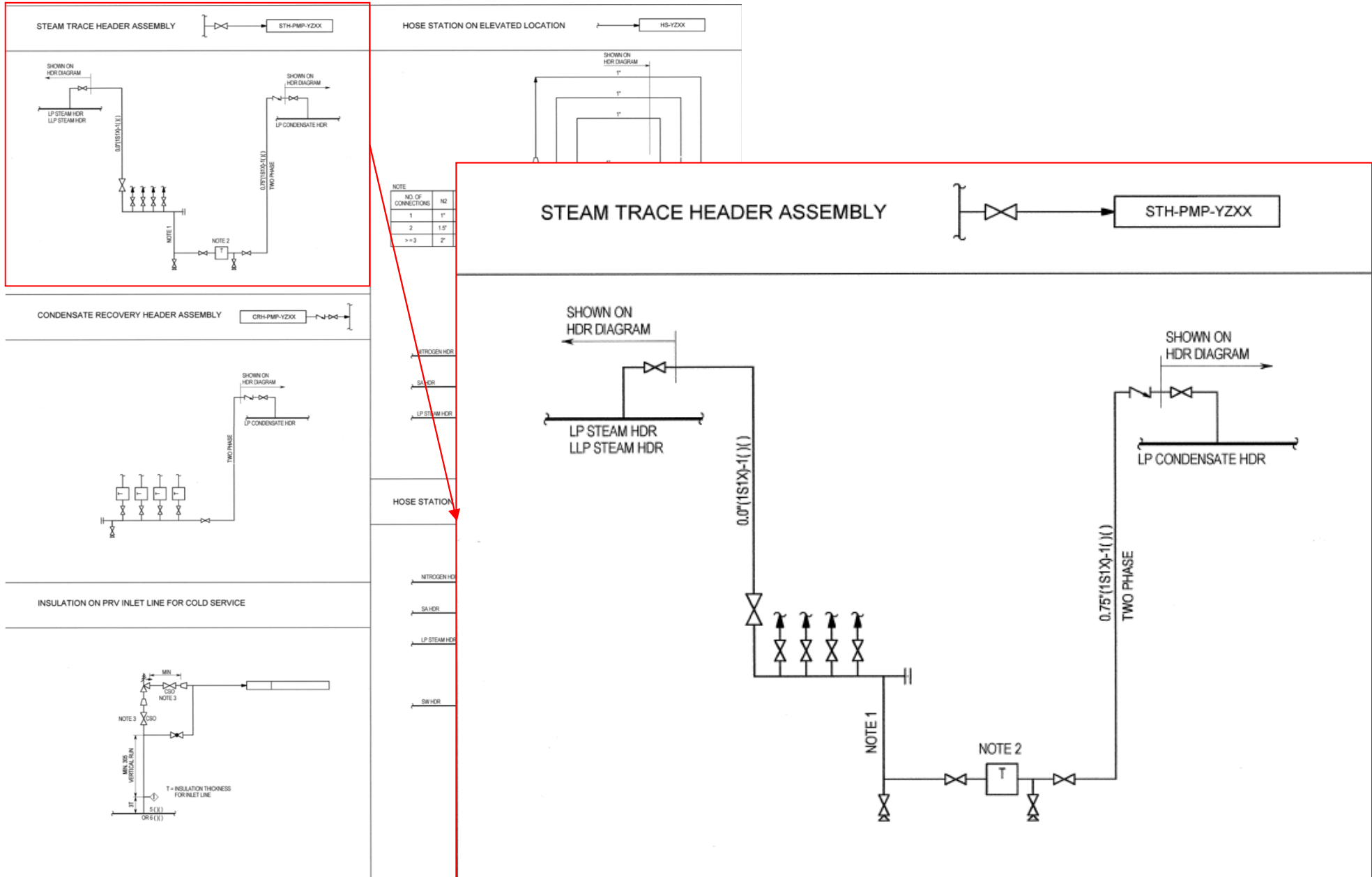


- **Various types of P&IDs**
 - Legend and Symbols
 - **Details and Typicals**
 - Process or Utility P&ID
 - Distribution P&ID
 - Interconnection P&ID
 - Pumps auxiliary P&ID
 - Package P&ID

- **Various types of P&IDs**
 - Legend and Symbols
 - **Details and Typicals**
 - Piping Details
 - Piping typical arrangements
 - Instrument Details
 - ON/OFF valves Typicals
 - Motors Typicals
 - Sample Connection Details

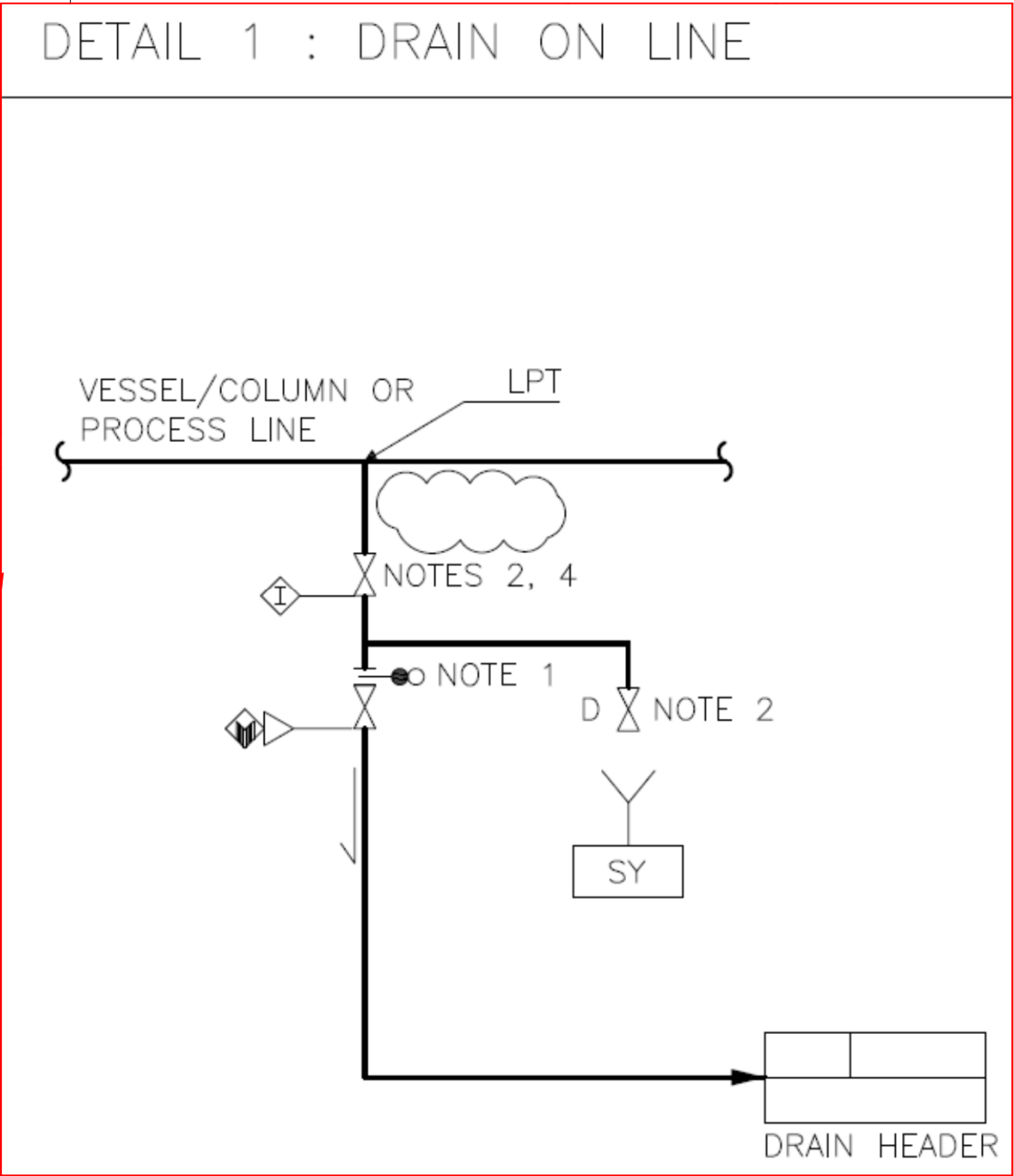
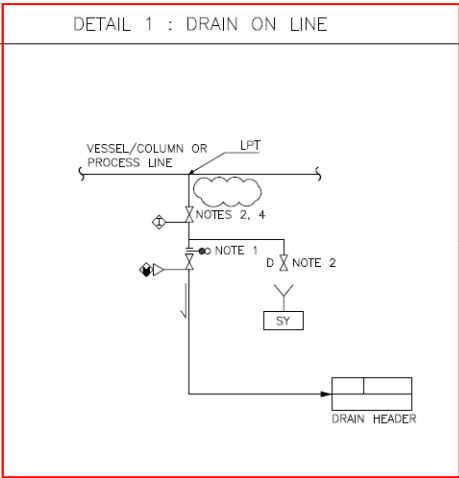
- **Various types of P&IDs**
 - Legend and Symbols
 - **Details and Typical**
 - **Piping Details**
 - Piping typical arrangements
 - Instrument Details
 - ON/OFF valves Typical
 - Motors Typical
 - Sample Connection Details

PIPING DETAILS (2/2)

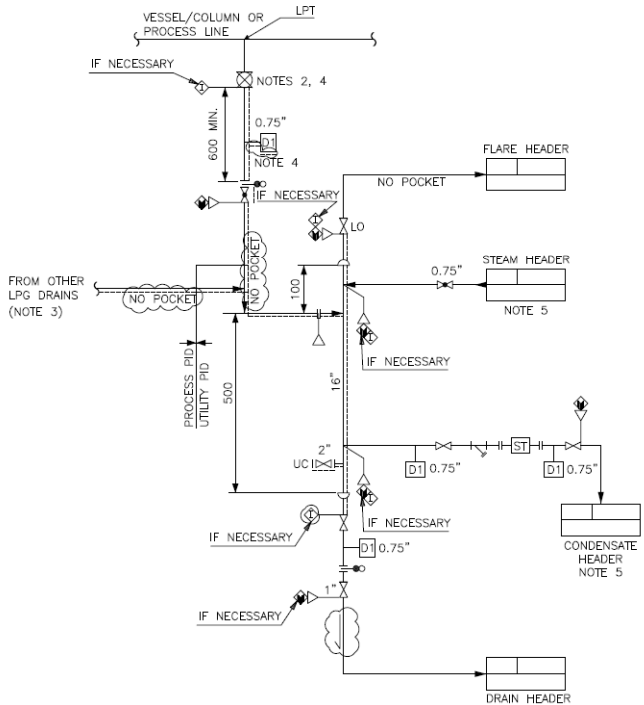


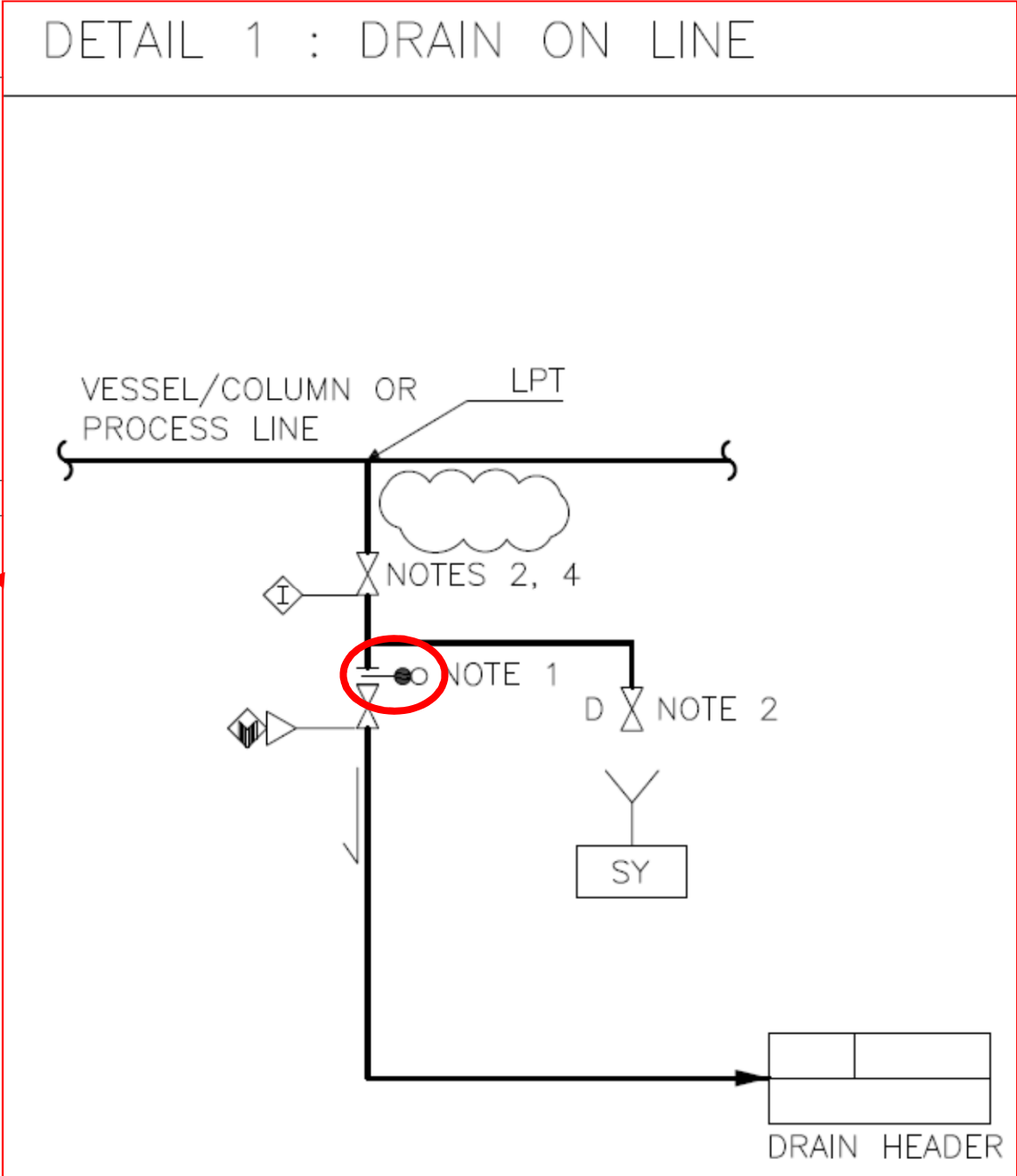
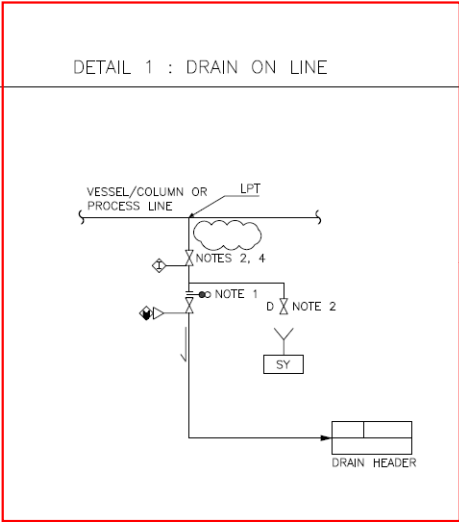
- **Various types of P&IDs**
 - Legend and Symbols
 - **Details and Typicals**
 - Piping Details
 - **Piping typical arrangements**
 - Instrument Details
 - ON/OFF valves Typicals
 - Motors Typicals
 - Sample Connection Details

Piping typical arrangements

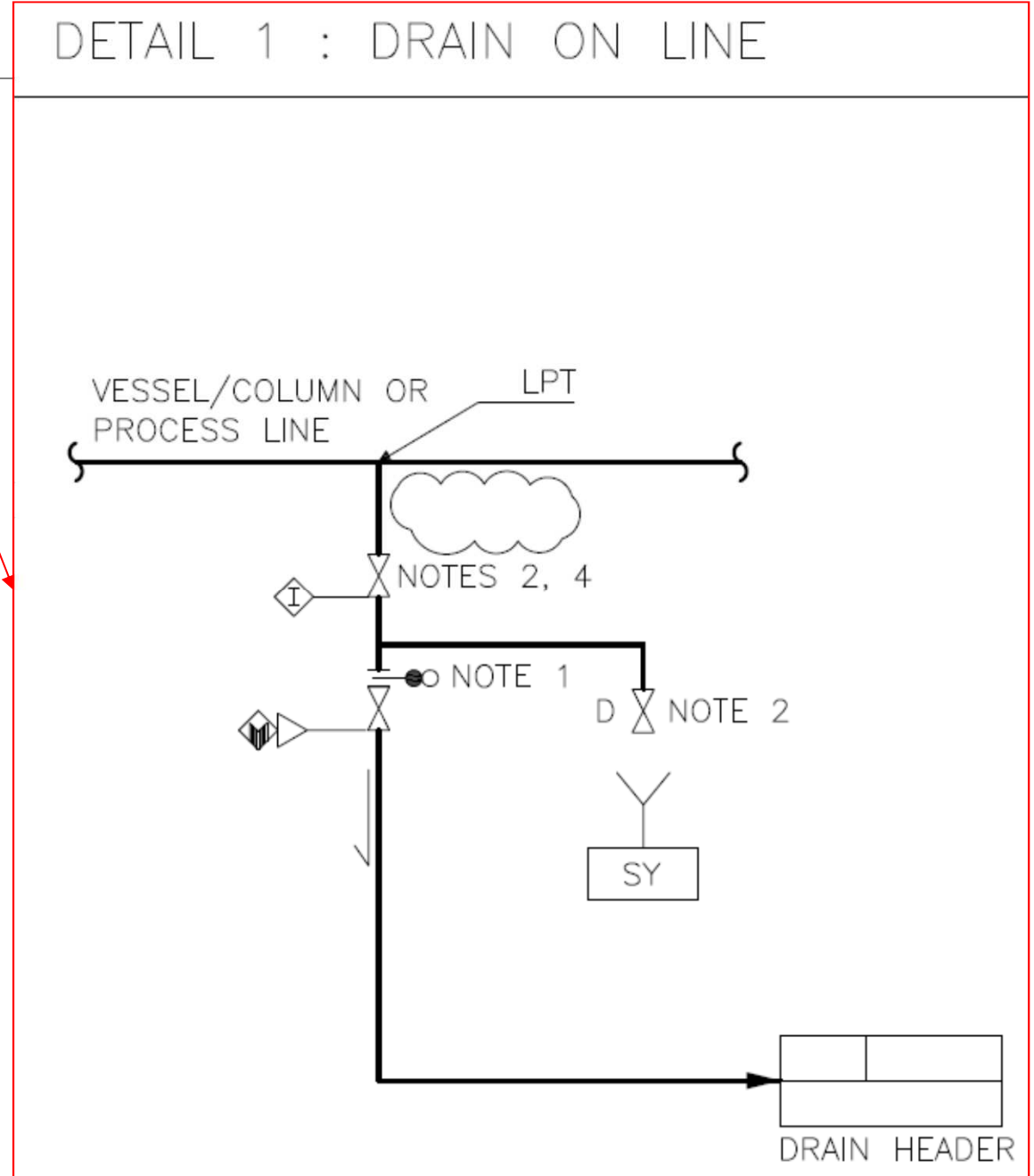
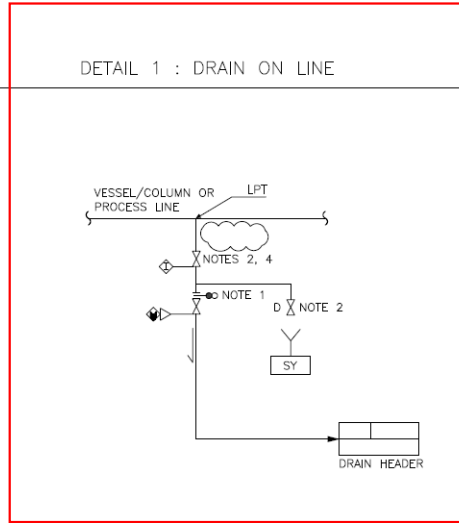


DETAIL 3: DRAIN ARRANGEMENT FOR LPG SERVICE





What is the meaning of this symbol, why is it in this position?

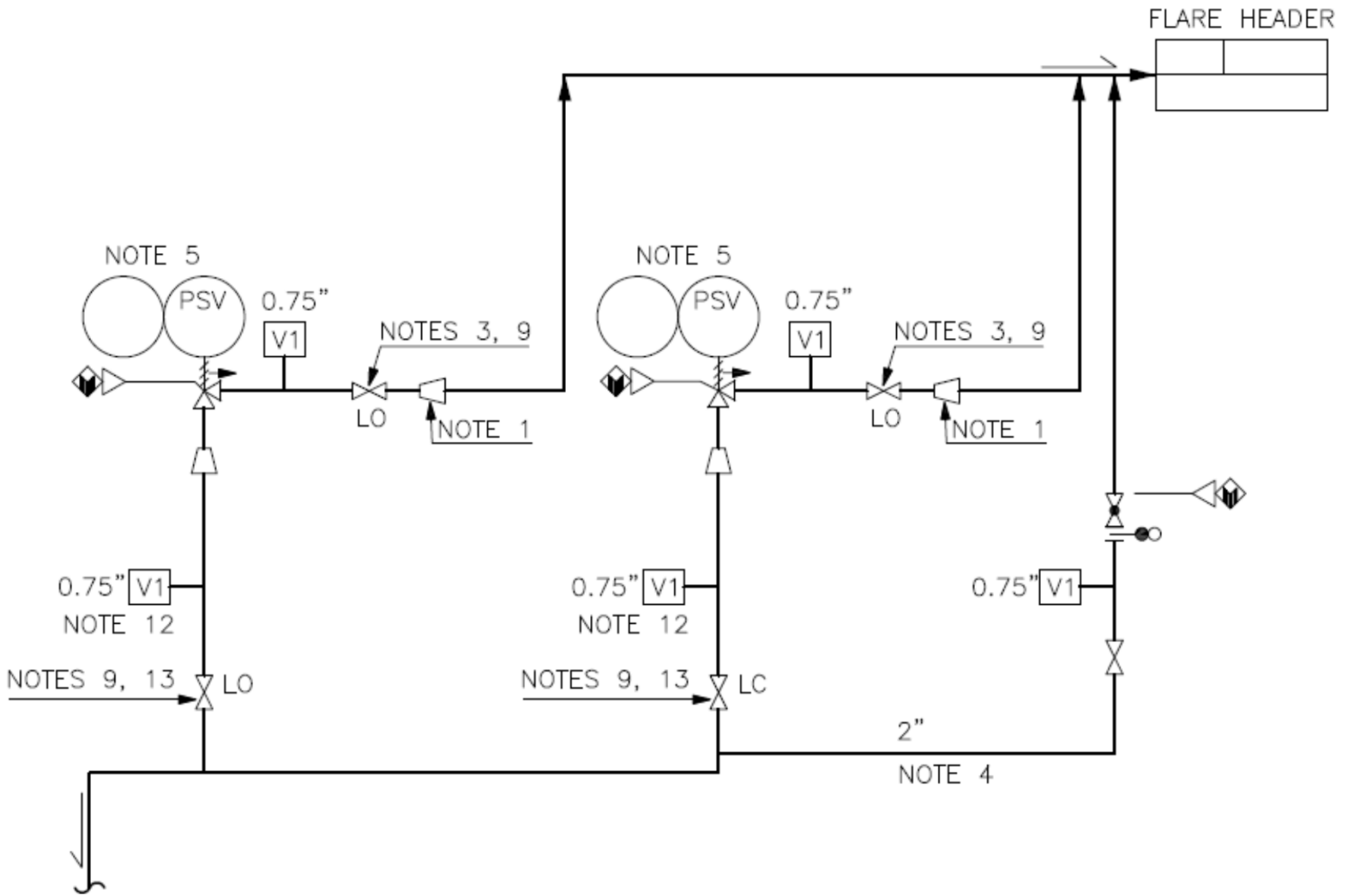


What is the meaning of this symbol, why is it in this position?

Spacer/blind (also called “figure 8”, spectacle/blind) in *closed* position.

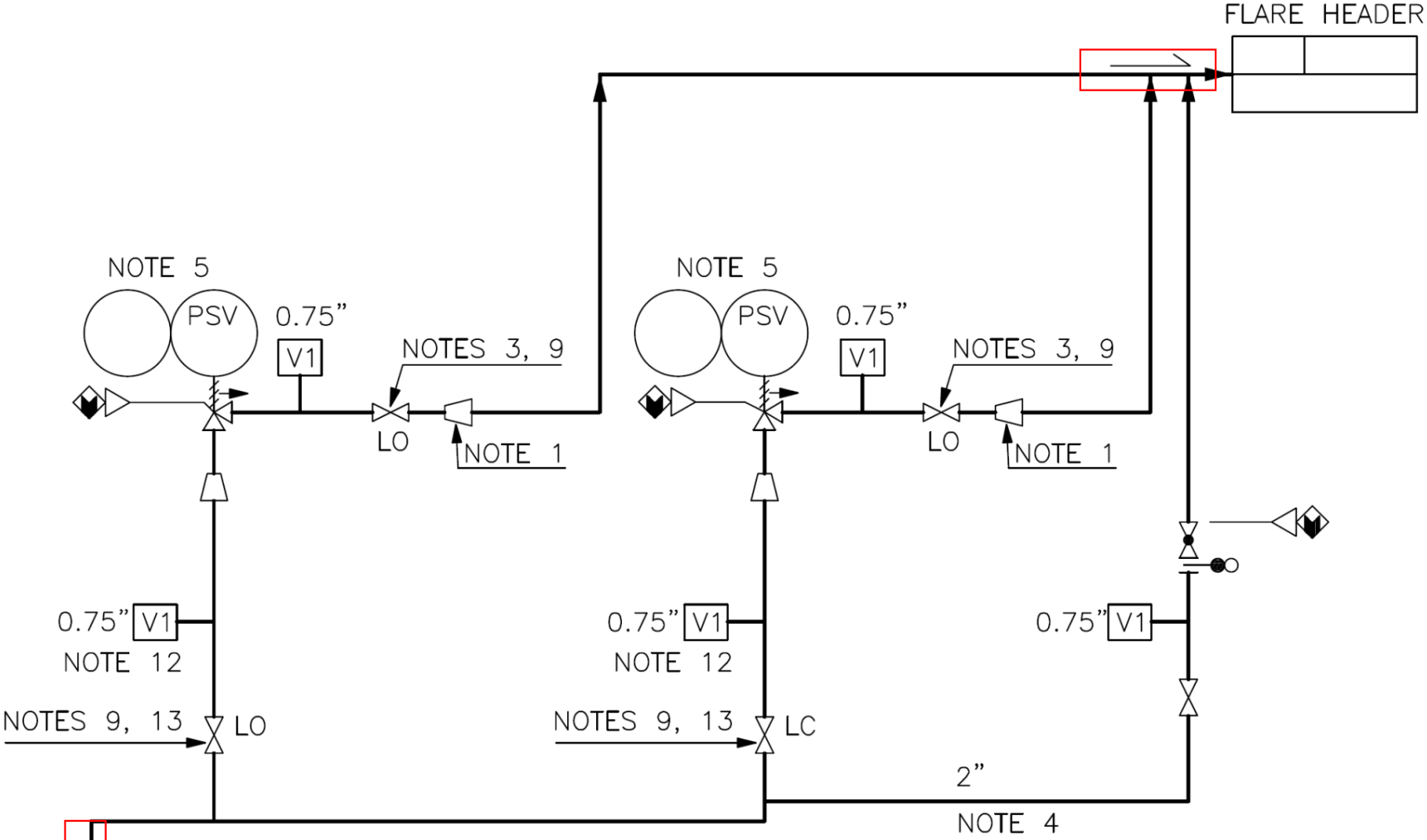
It is in closed position to prevent miss-operation of drain by operator, such as draining before depressurizing.

DETAIL 1: GENERAL PSV'S INSTALLATION
NOTE 15



DETAIL 1: GENERAL PSV'S INSTALLATION

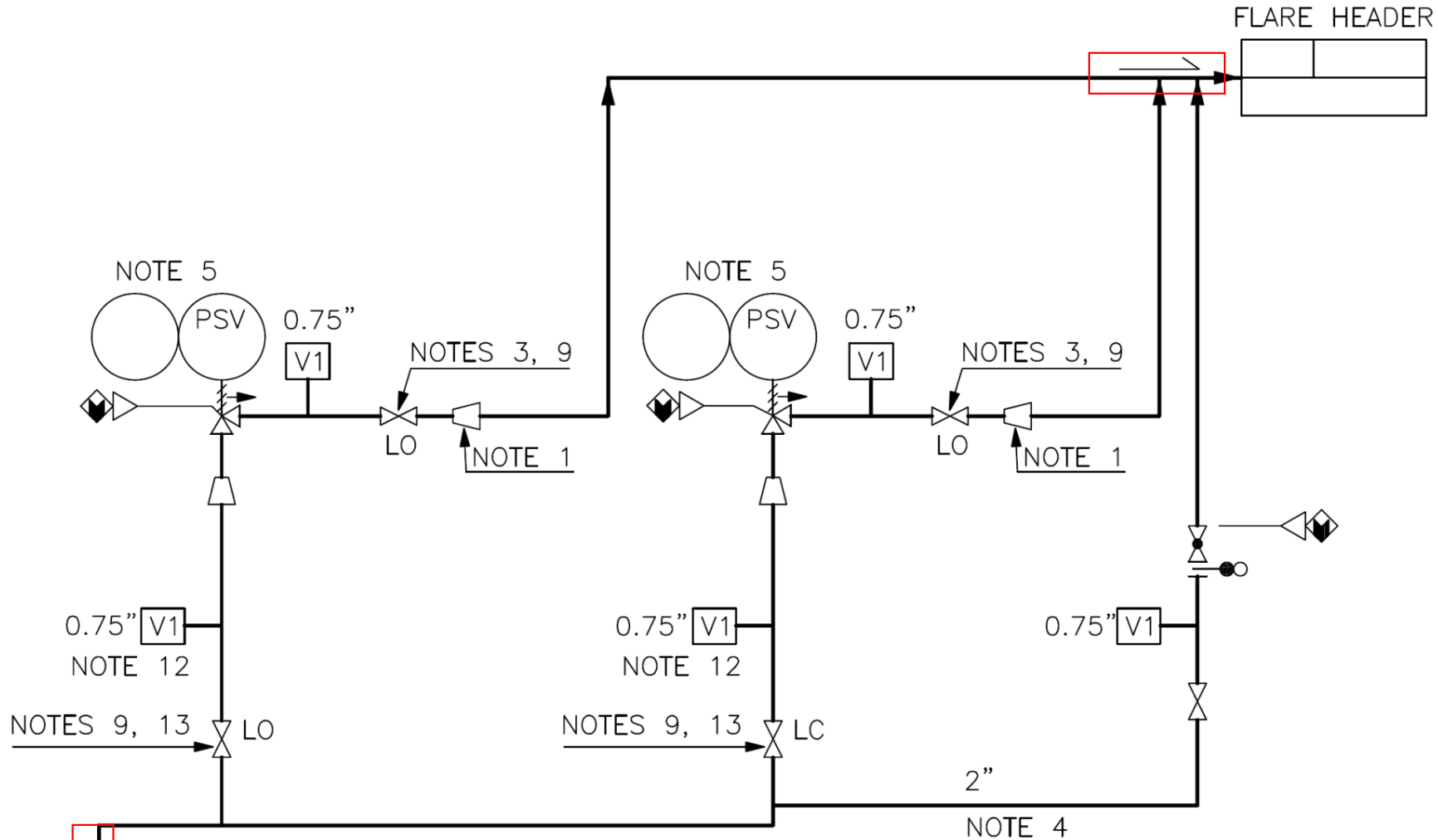
NOTE 15



What do these indications mean?

DETAIL 1: GENERAL PSV'S INSTALLATION

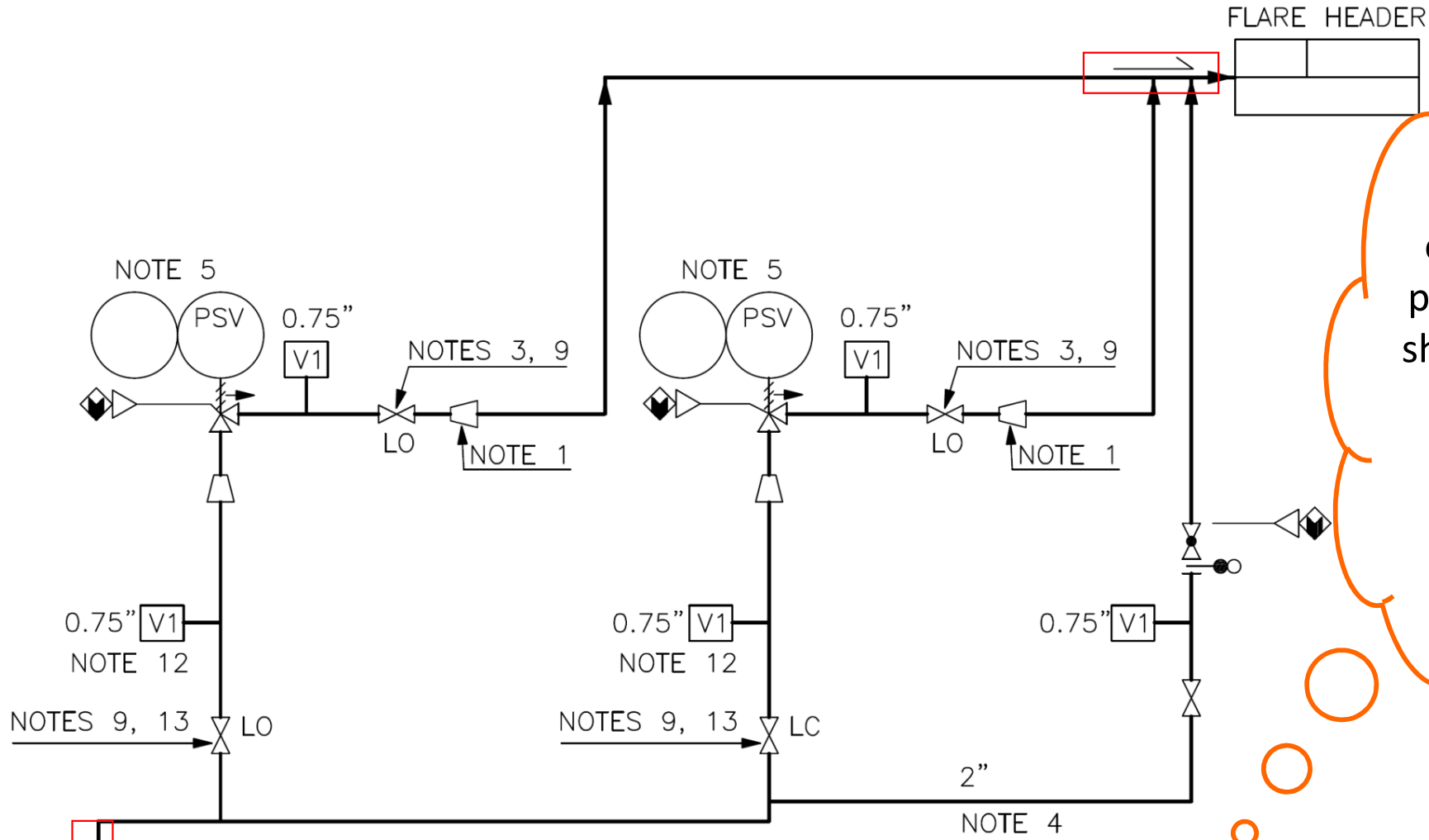
NOTE 15



What do these indications mean? That the line shall be sloped, without pocket, to prevent accumulation of condensed gas.

DETAIL 1: GENERAL PSV'S INSTALLATION

NOTE 15

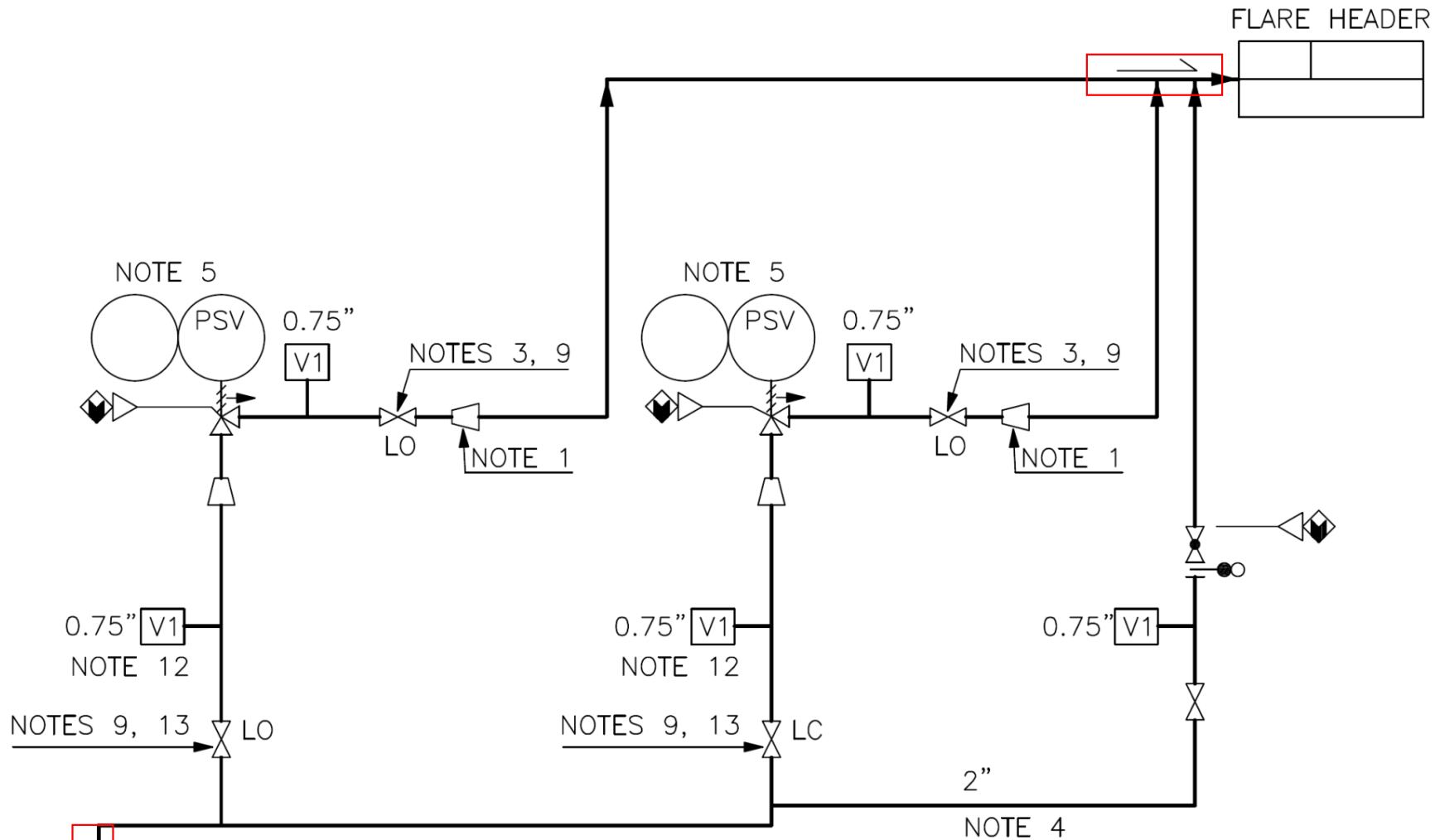


This is an example of prescriptions shown on the P&ID by Process to Piping discipline

What do these indications mean? That the line shall be sloped, without pocket, to prevent accumulation of condensed gas.

DETAIL 1: GENERAL PSV'S INSTALLATION

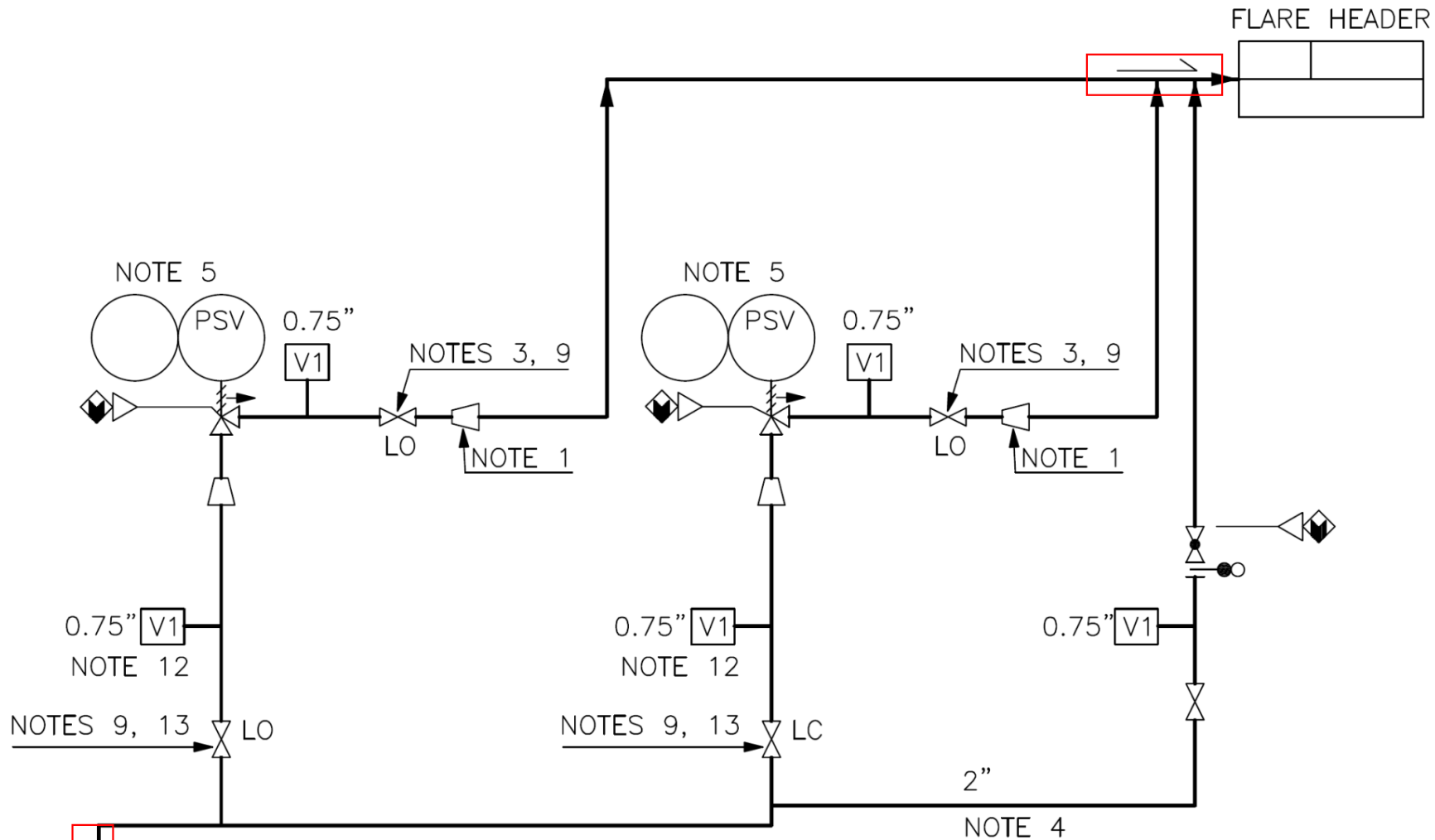
NOTE 15



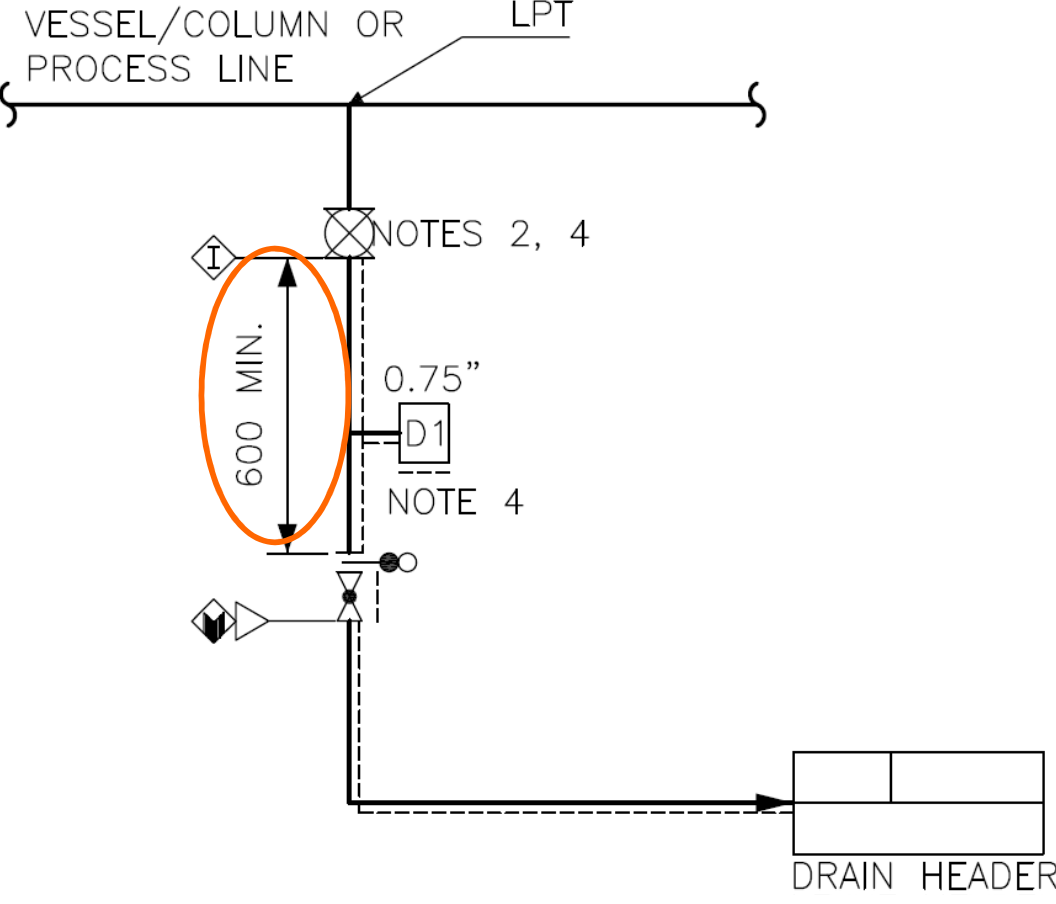
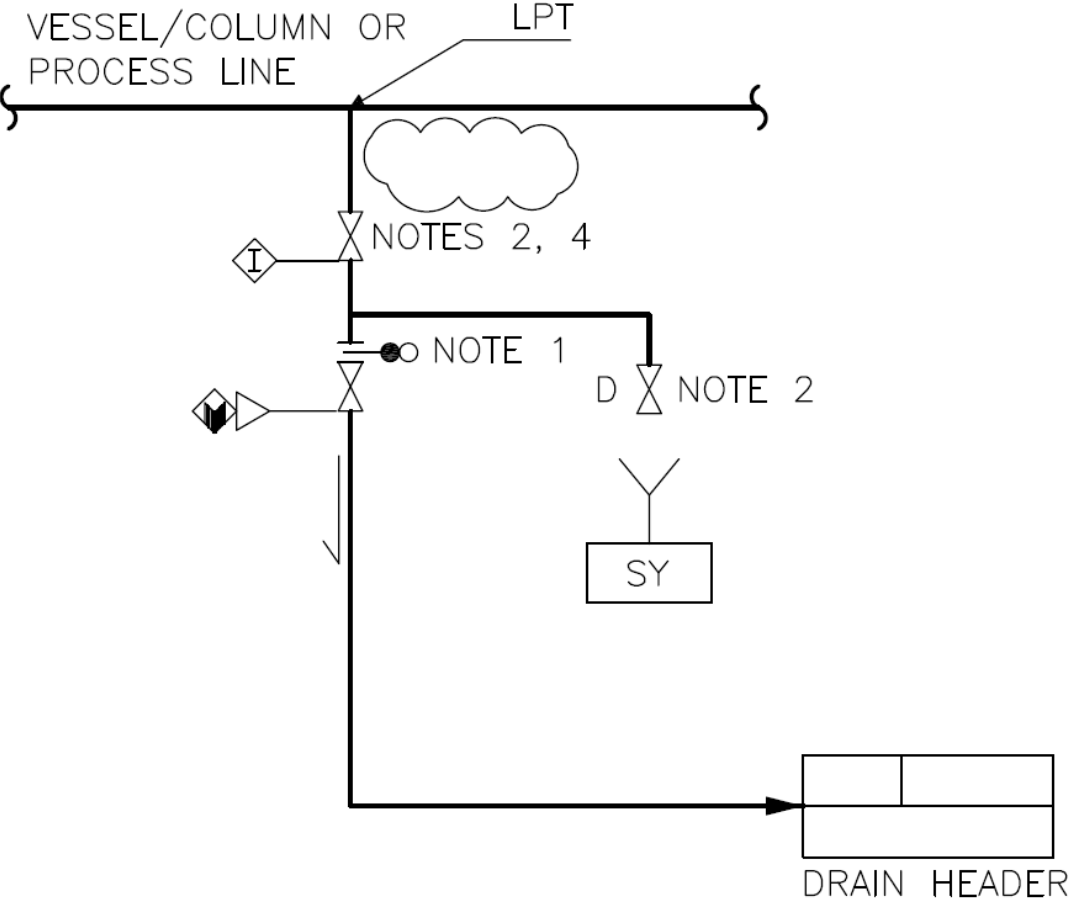
On which other lines do you find similar requirements pertaining to the routing of the line?

DETAIL 1: GENERAL PSV'S INSTALLATION

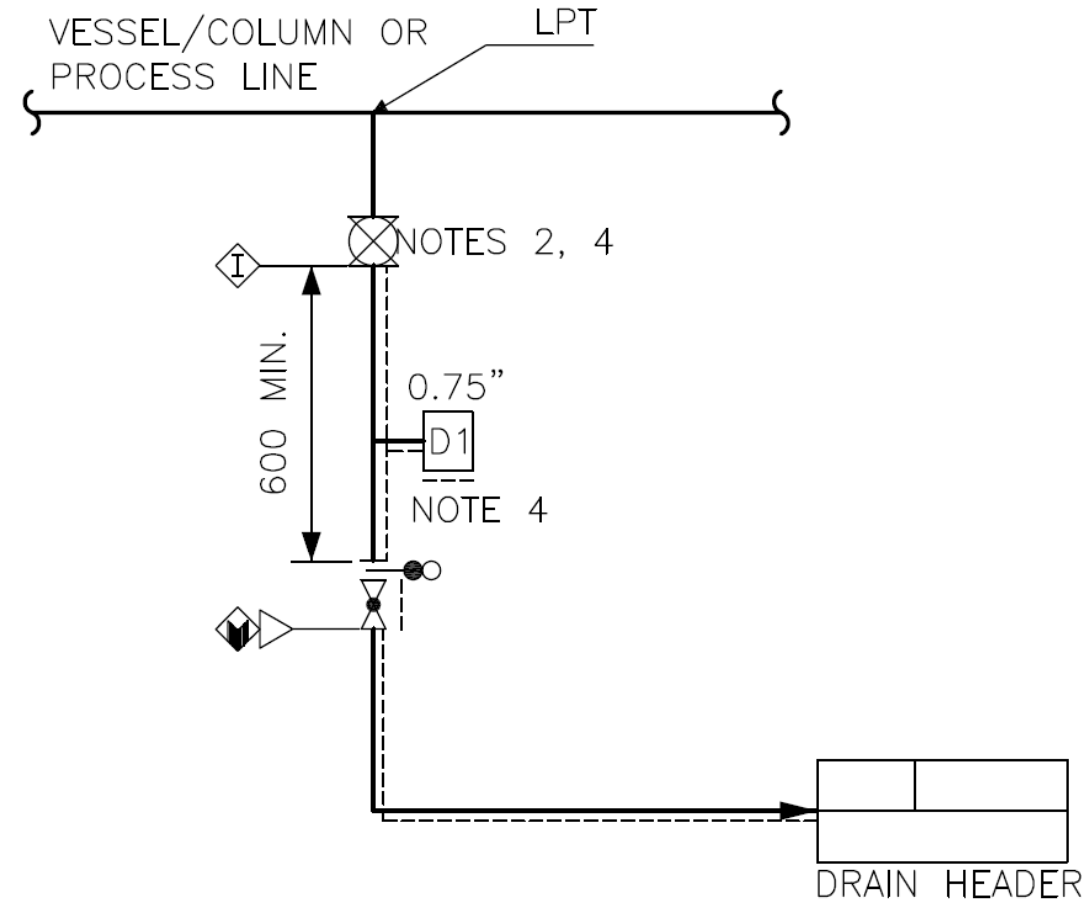
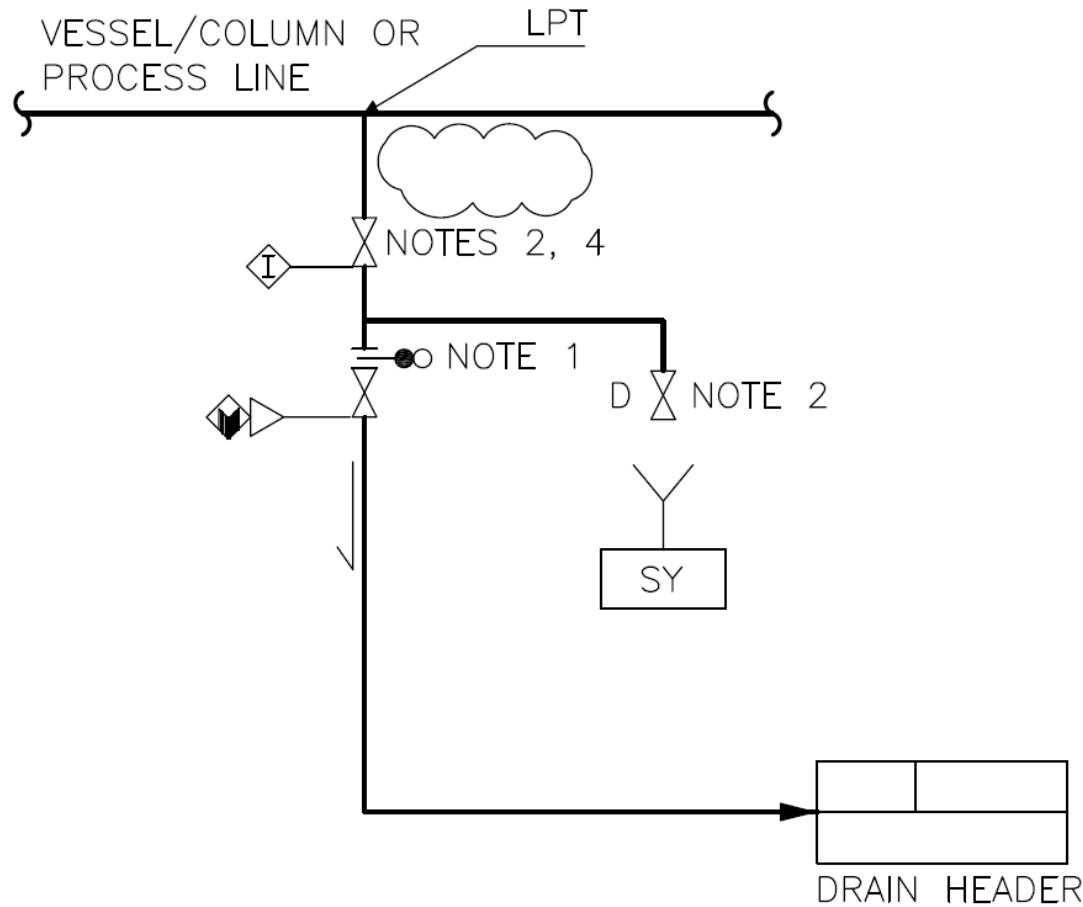
NOTE 15



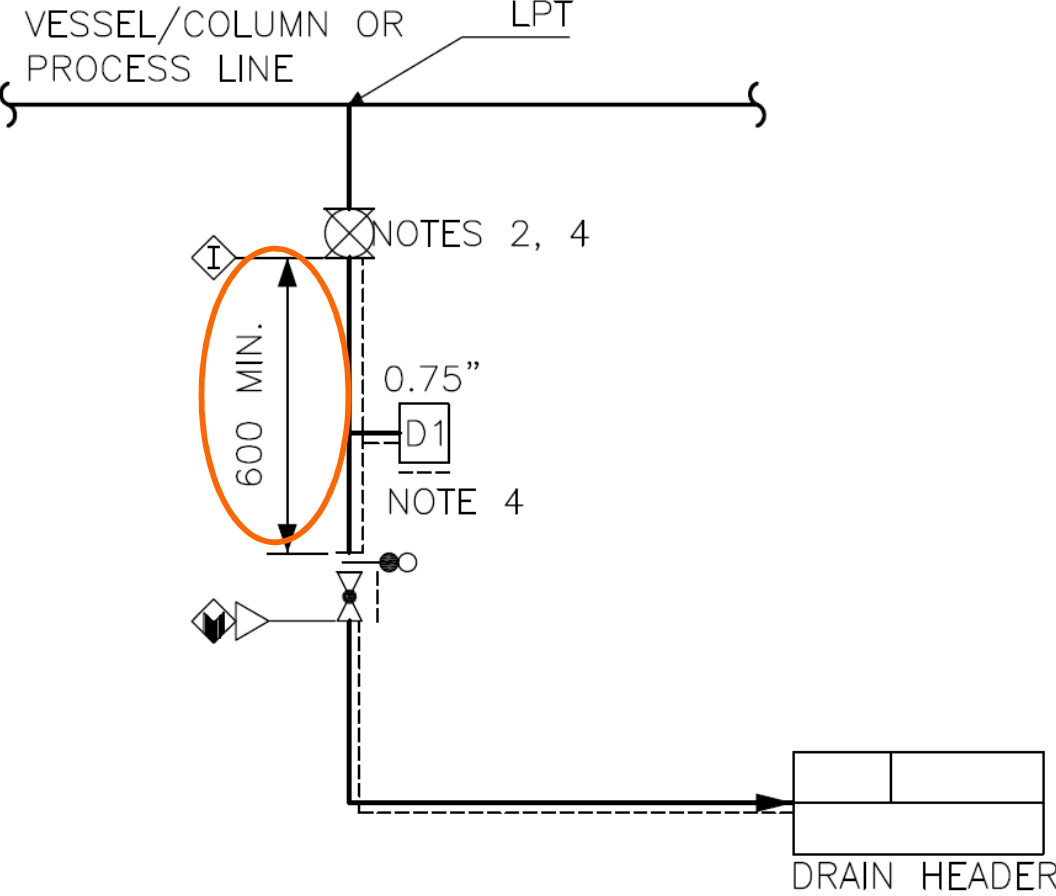
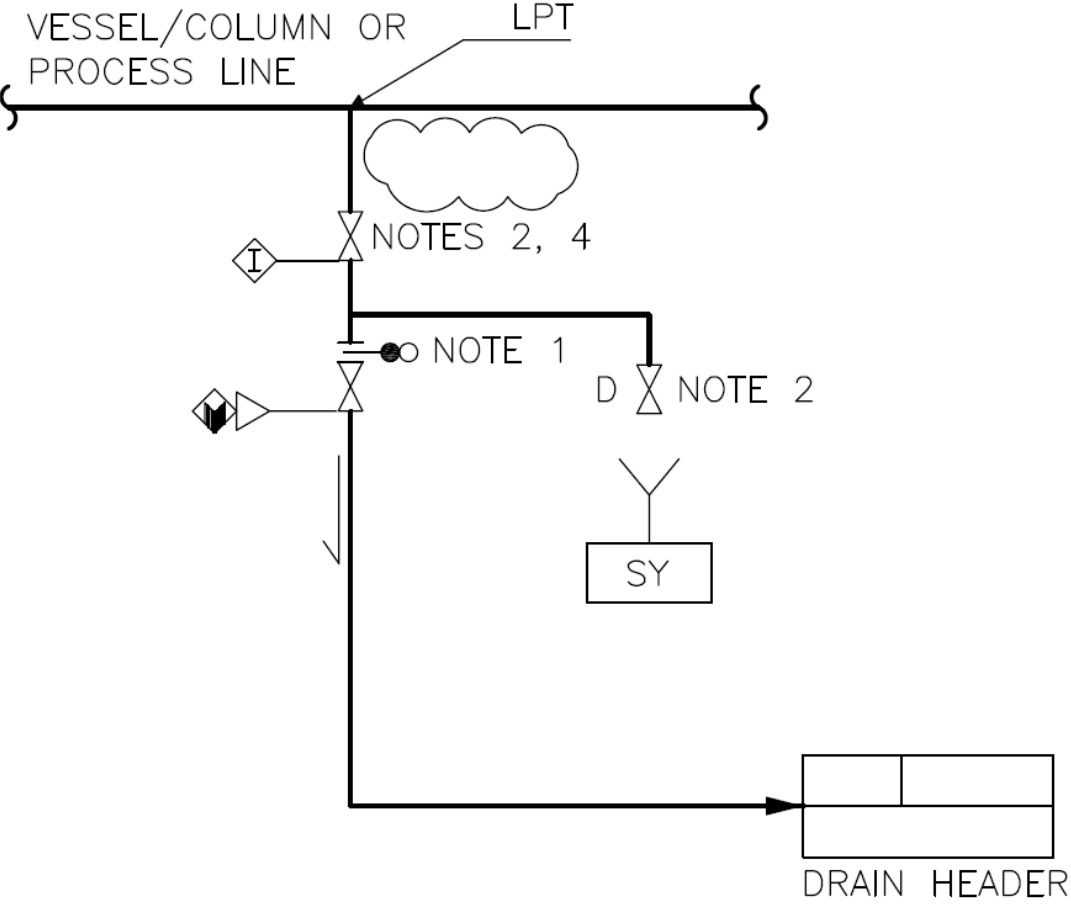
On which other lines do you find similar requirements pertaining to the routing of the line? Gravity/Free draining line, line with no pocket, e.g., compressor suction line



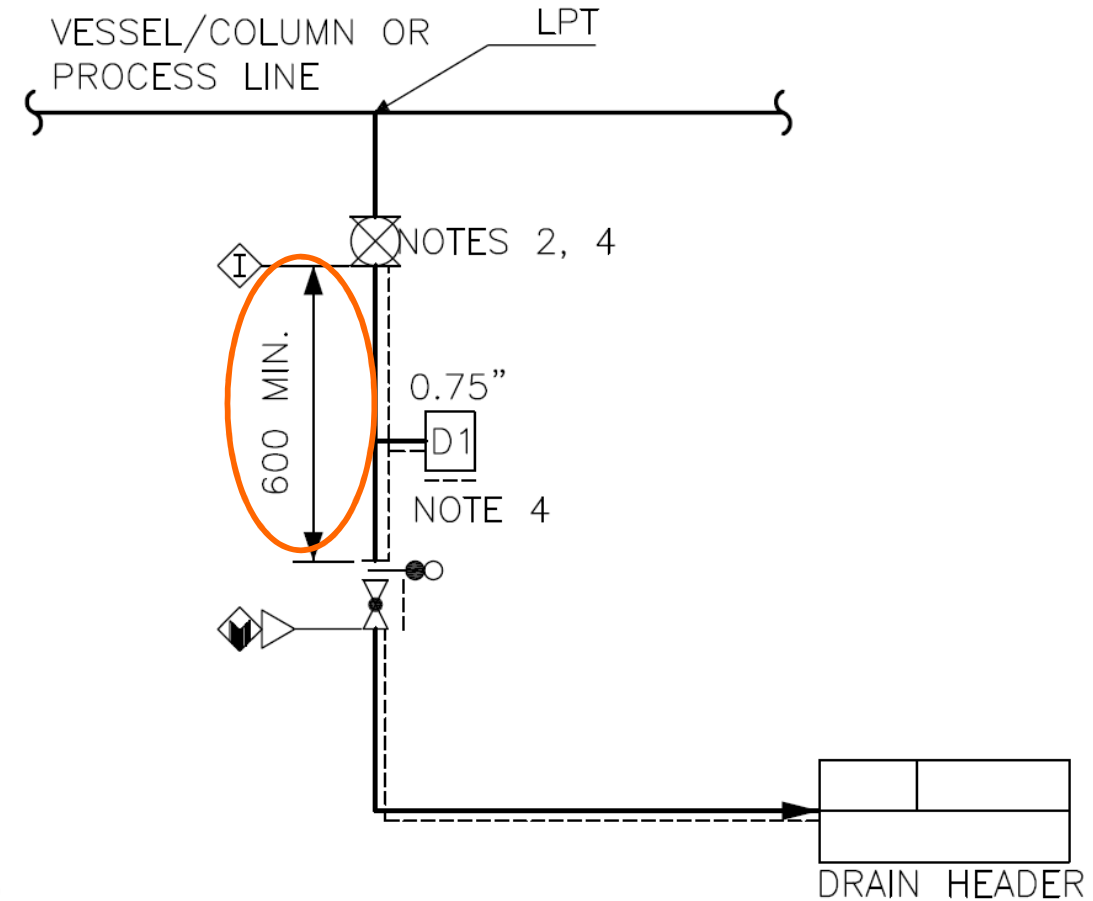
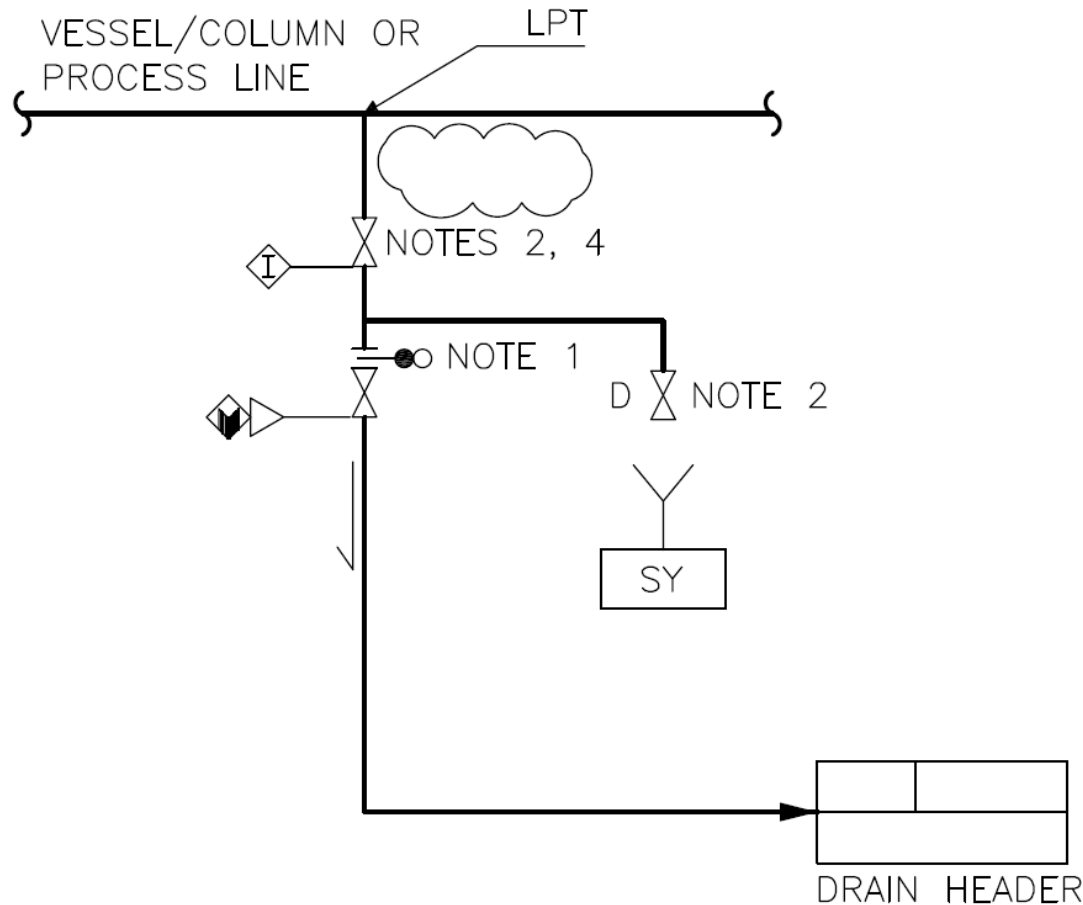
What is the difference between these two drain typicals?



What is the difference between these two drain typicals? A minimum distance between valves and heat tracing are specified on the right one, the type of valves is different



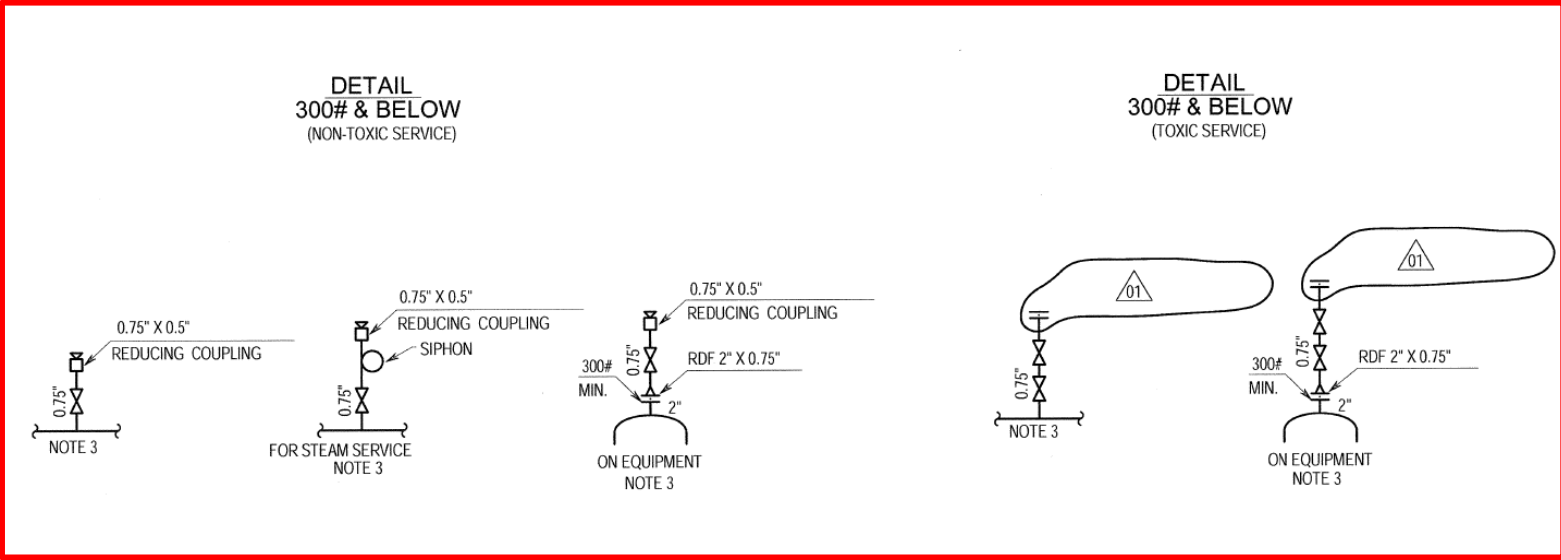
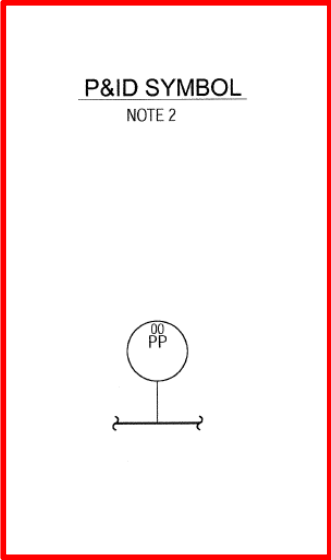
Why is there a minimum distance specified between the valves?



Why is there a minimum distance specified between the valves? To prevent freezing of the second (downstream) valve due to flashing liquid in the first one. This would prevent the closing of the second valve. This is what happened in the Feyzin refinery accident in France and this minimum distance has been specified ever since.

- **Various types of P&IDs**
 - Legend and Symbols
 - **Details and Typical**
 - Piping Details
 - Piping typical arrangements
 - **Instrument Details**
 - ON/OFF valves Typical
 - Motors Typical
 - Sample Connection Details

INSTRUMENT CONNECTION DETAILS

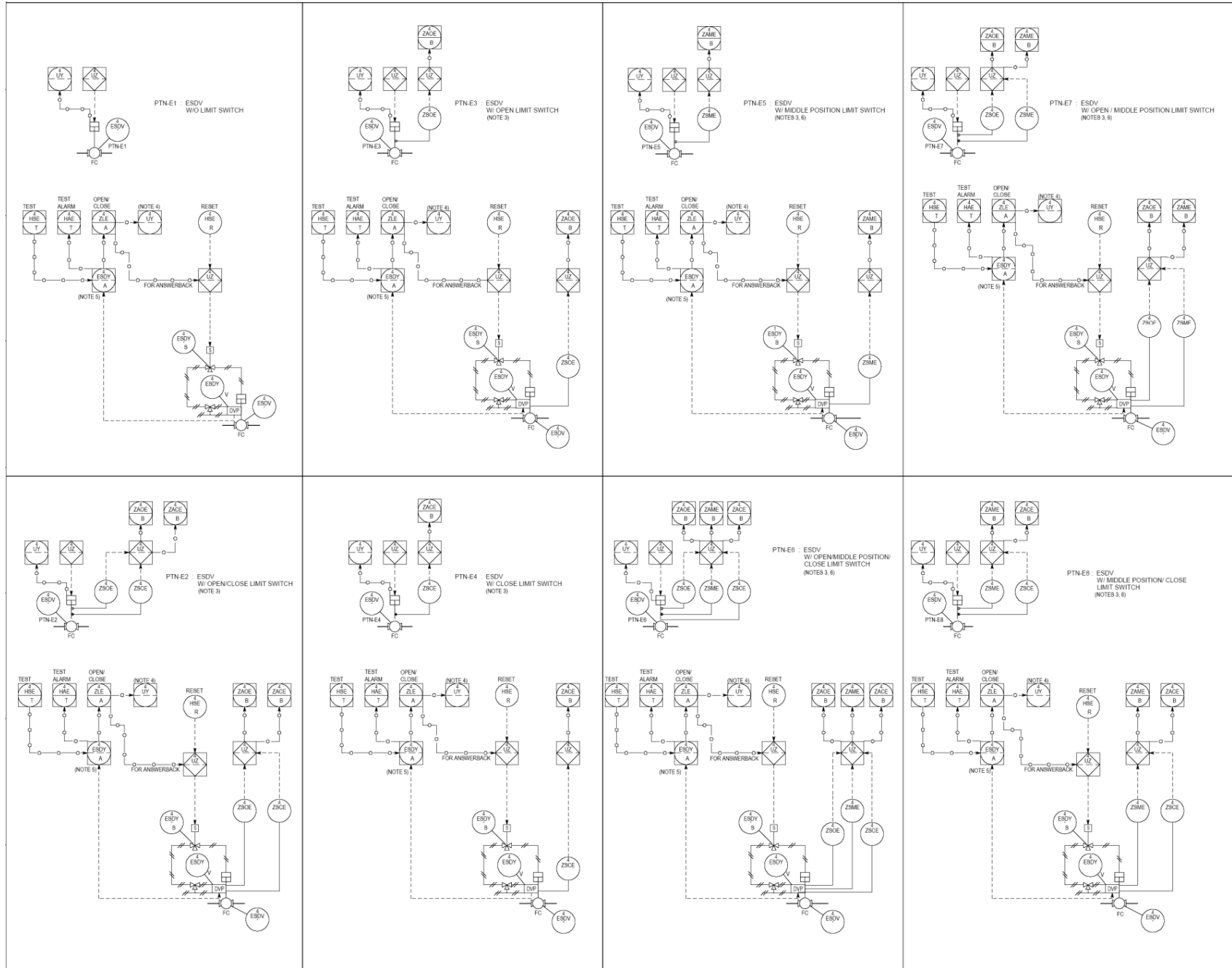


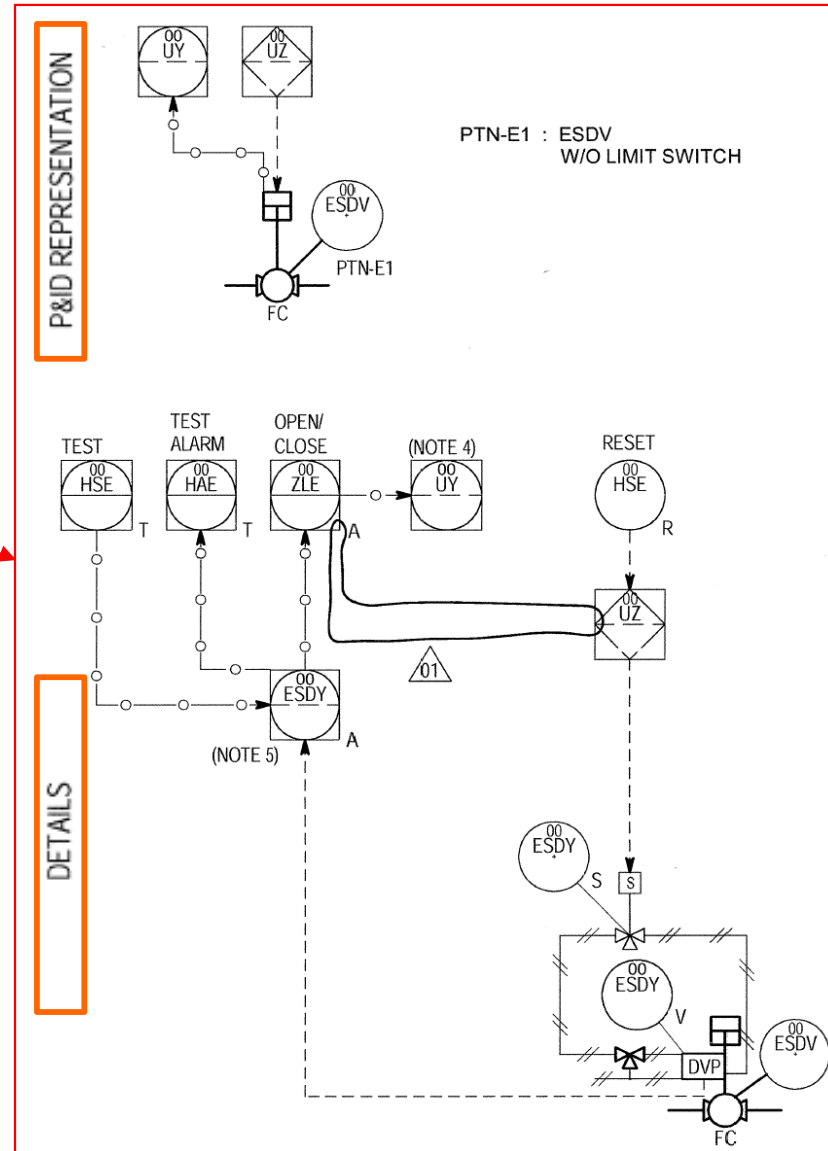
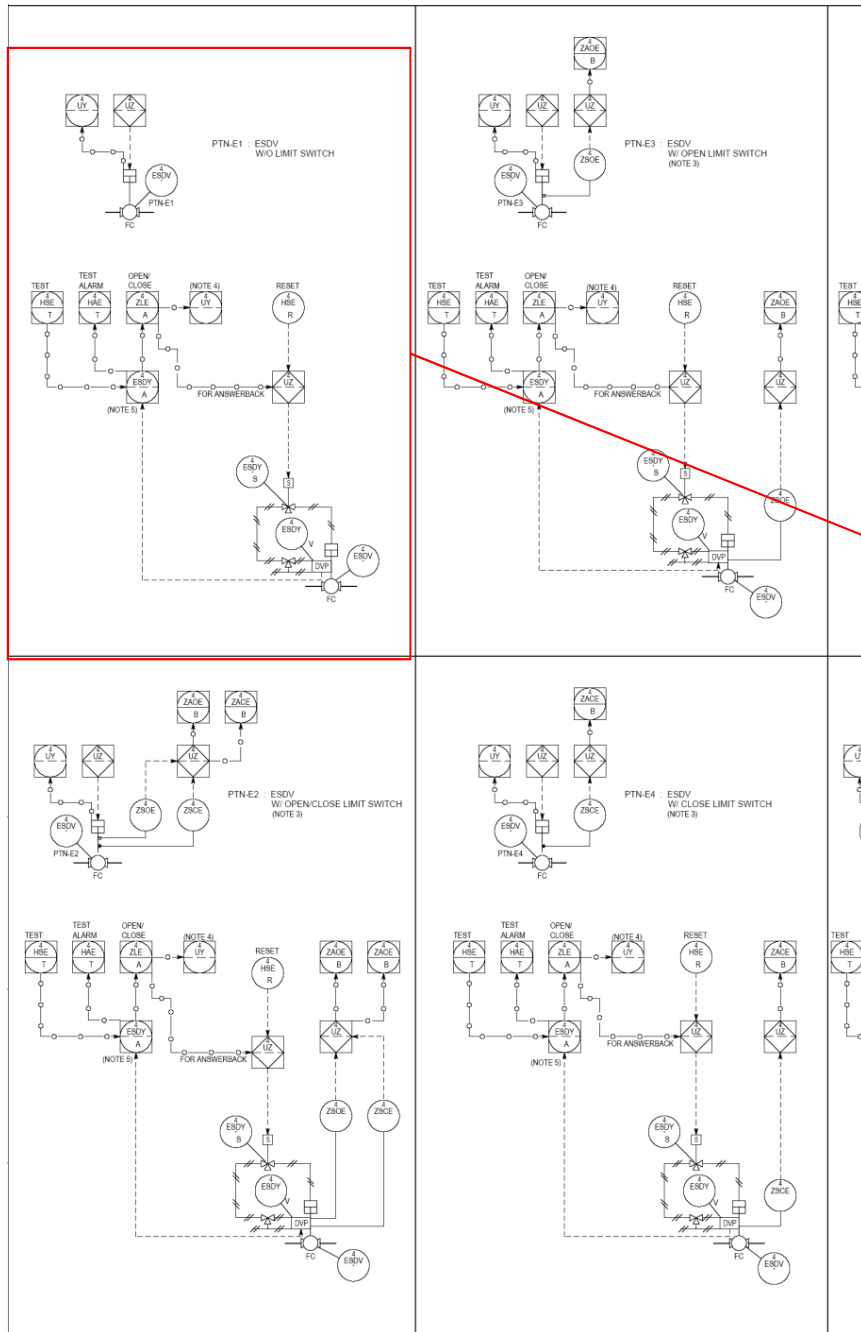
Depiction on P&ID



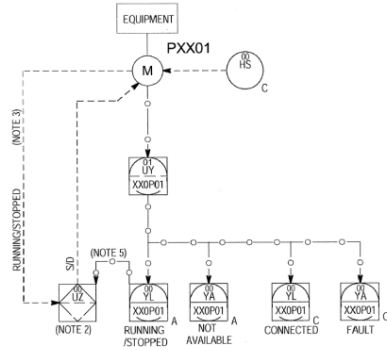
Corresponding details

- **Various types of P&IDs**
 - Legend and Symbols
 - **Details and Typical**
 - Piping Details
 - Piping Arrangements
 - Instrument Details
 - **ON/OFF valves Typical**
 - Motors Typical
 - Sample Connection Details

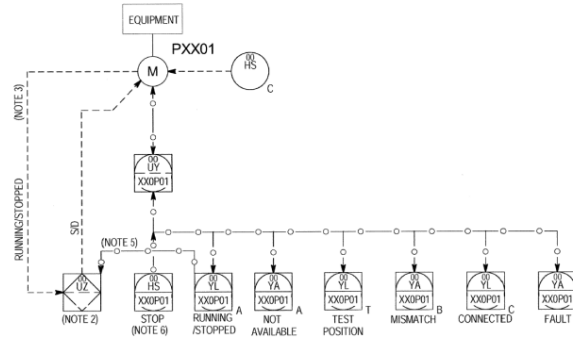




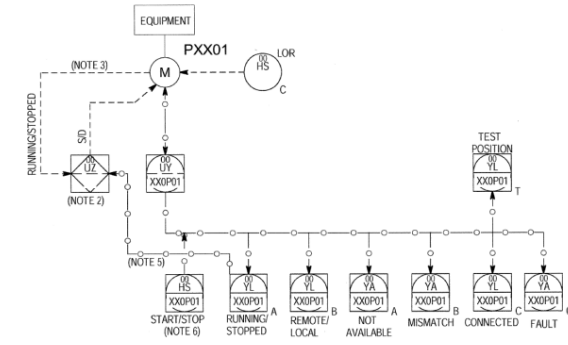
- **Various types of P&IDs**
 - Legend and Symbols
 - **Details and Typical**
 - Piping Details
 - Piping Arrangements
 - Instrument Details
 - ON/OFF valves Typical
 - **Motors Typical**
 - Sample Connection Details



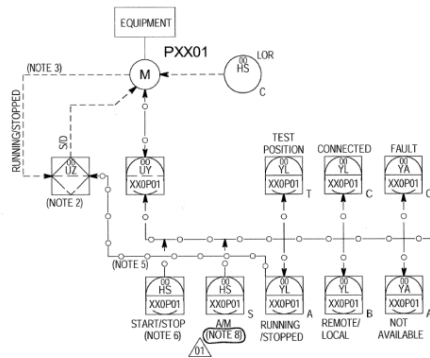
MOTOR W/LOCAL START/STOP
TYPE 1



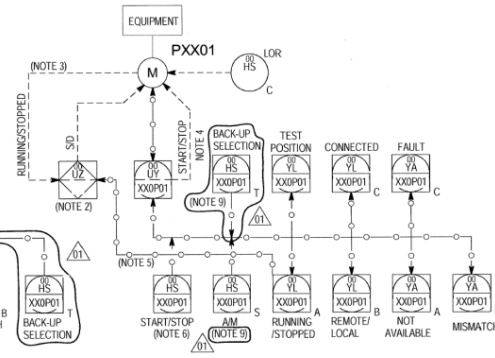
MOTOR W/REMOTE STOP
TYPE 2



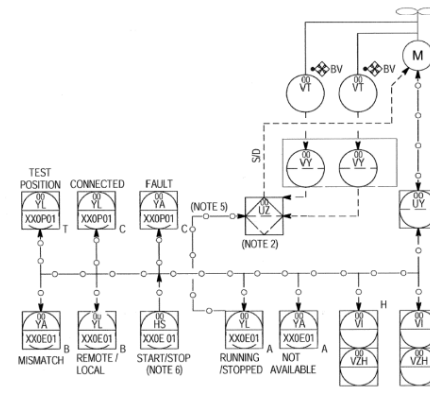
MOTOR W/REMOTE START/STOP
TYPE 3



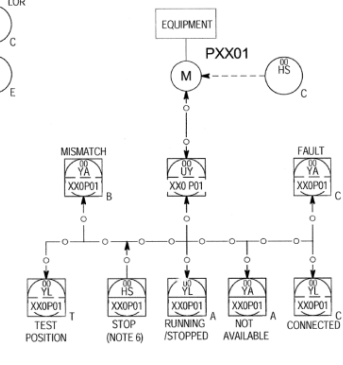
MOTOR W/AUTOMATIC START/STOP
TYPE 4



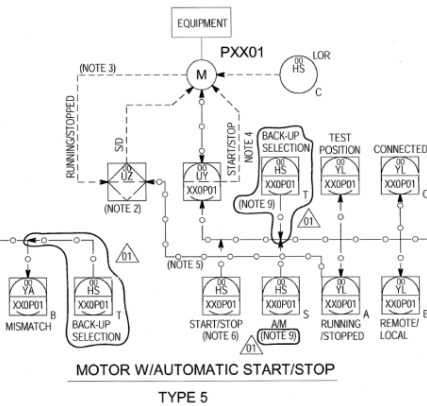
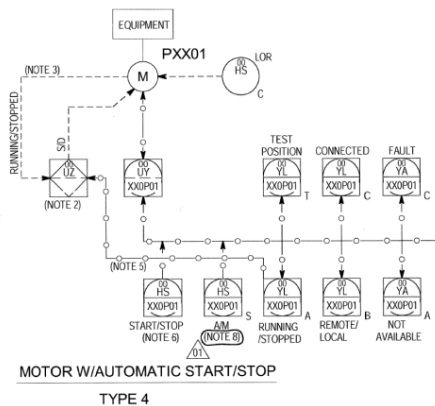
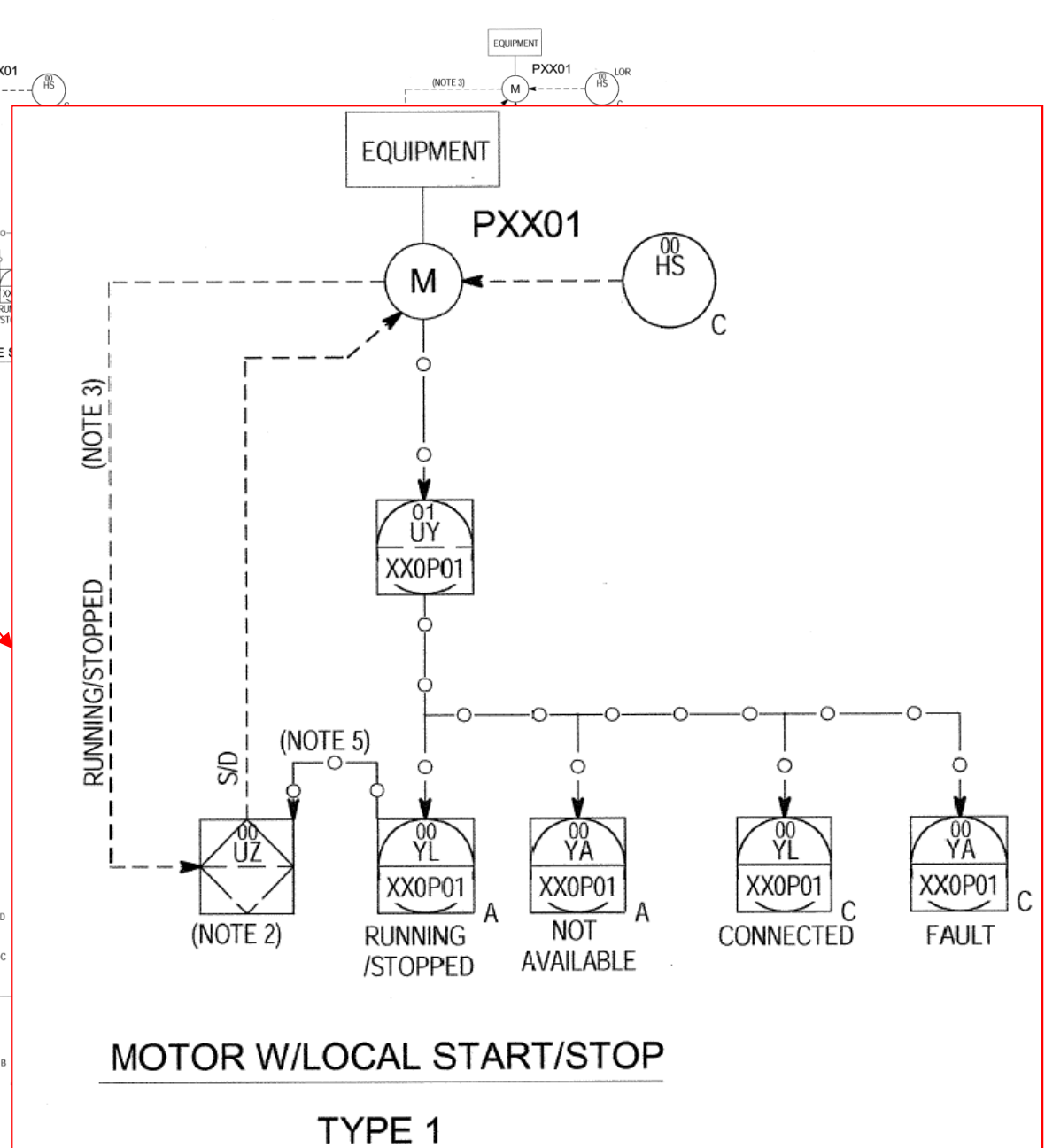
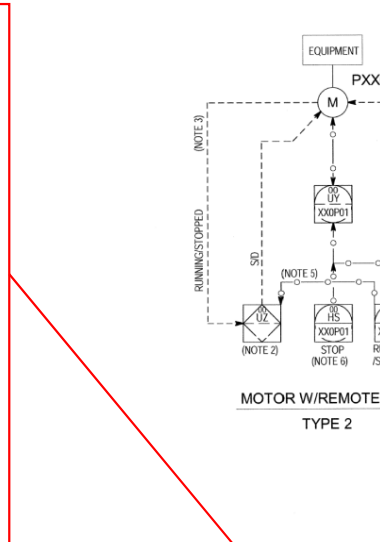
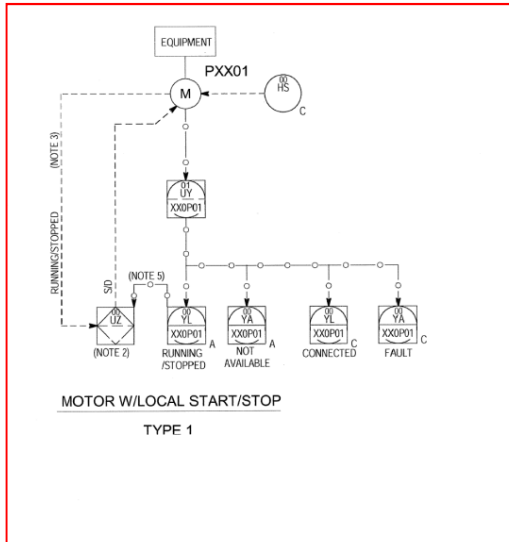
MOTOR W/AUTOMATIC START/STOP
TYPE 5



MOTOR FOR AIR COOLERS
TYPE 6



MOTOR W/REMOTE STOP WITHOUT S/D
TYPE 7



- **Various types of P&IDs**
 - Legend and Symbols
 - Details and **Typicals**
 - Piping Details
 - Piping typical arrangements
 - Instrument Details
 - ON/OFF valves Typicals
 - Motors Typicals
 - Sample Connection Details

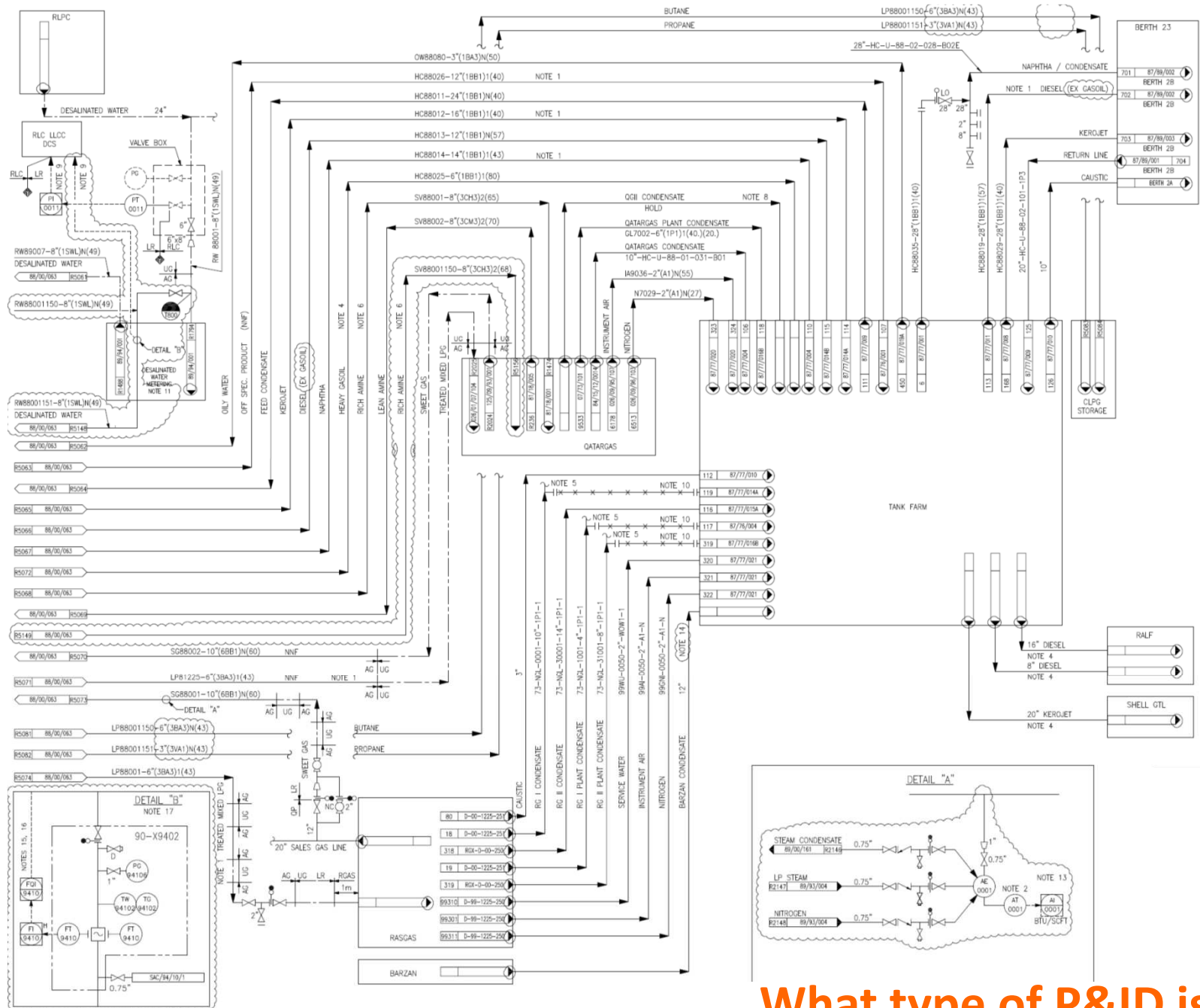
In your opinion, why such standardization is made?

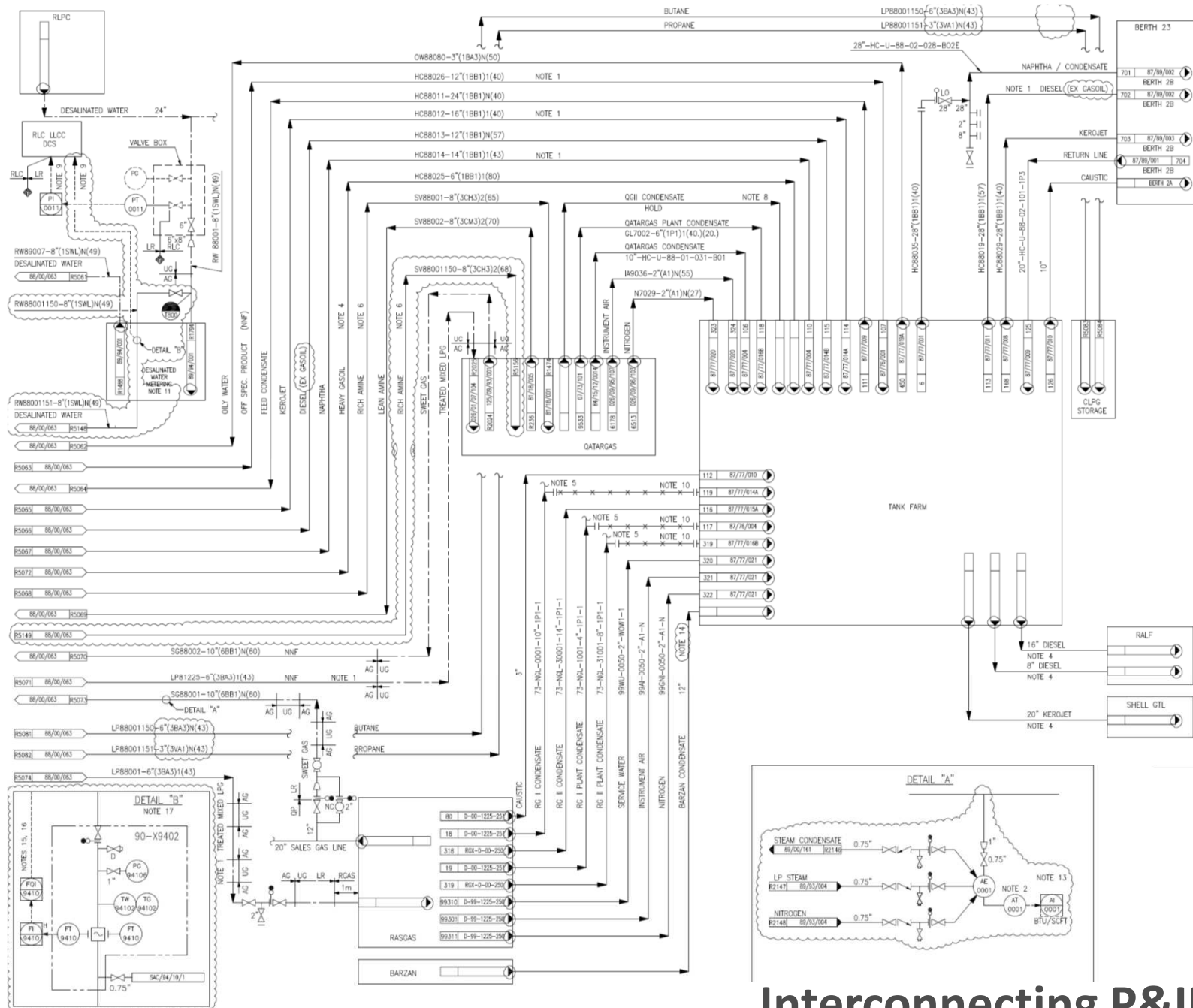
- **Various types of P&IDs**
 - Legend and Symbols
 - Details and **Typicals**
 - Piping Details
 - Piping typical arrangements
 - Instrument Details
 - ON/OFF valves Typicals
 - Motors Typicals
 - Sample Connection Details

Standardization is made

- **For safety**
- **For quality**
- **For consistency for operator**
- **For cost (CAPEX: bulk order + OPEX: spare parts)**

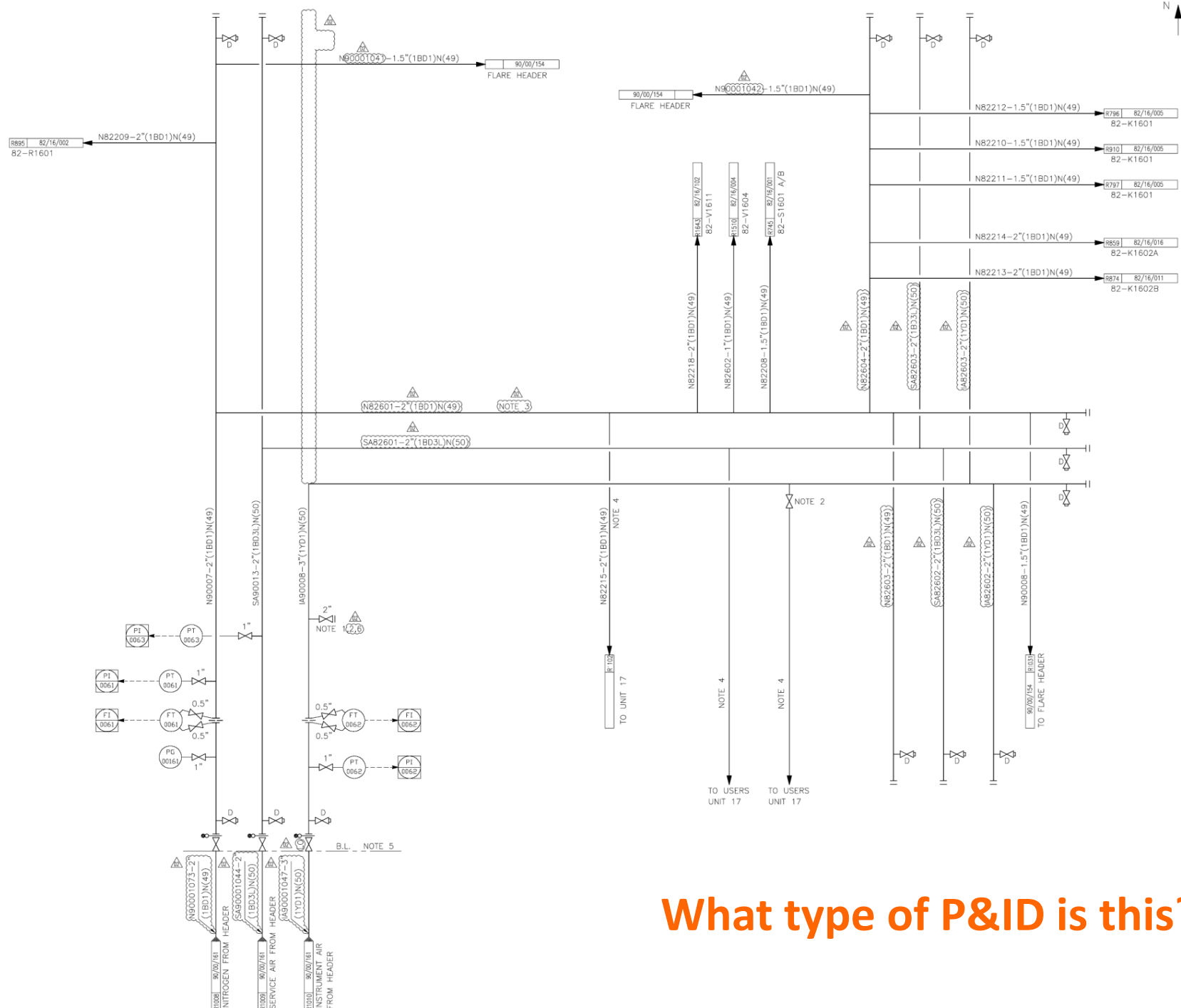
- **Various types of P&IDs**
 - Legend and Symbols
 - Details and Typical
 - Process or Utility P&ID
 - Distribution P&ID
 - Interconnection P&ID
 - Pumps auxiliary P&ID
 - Package P&ID



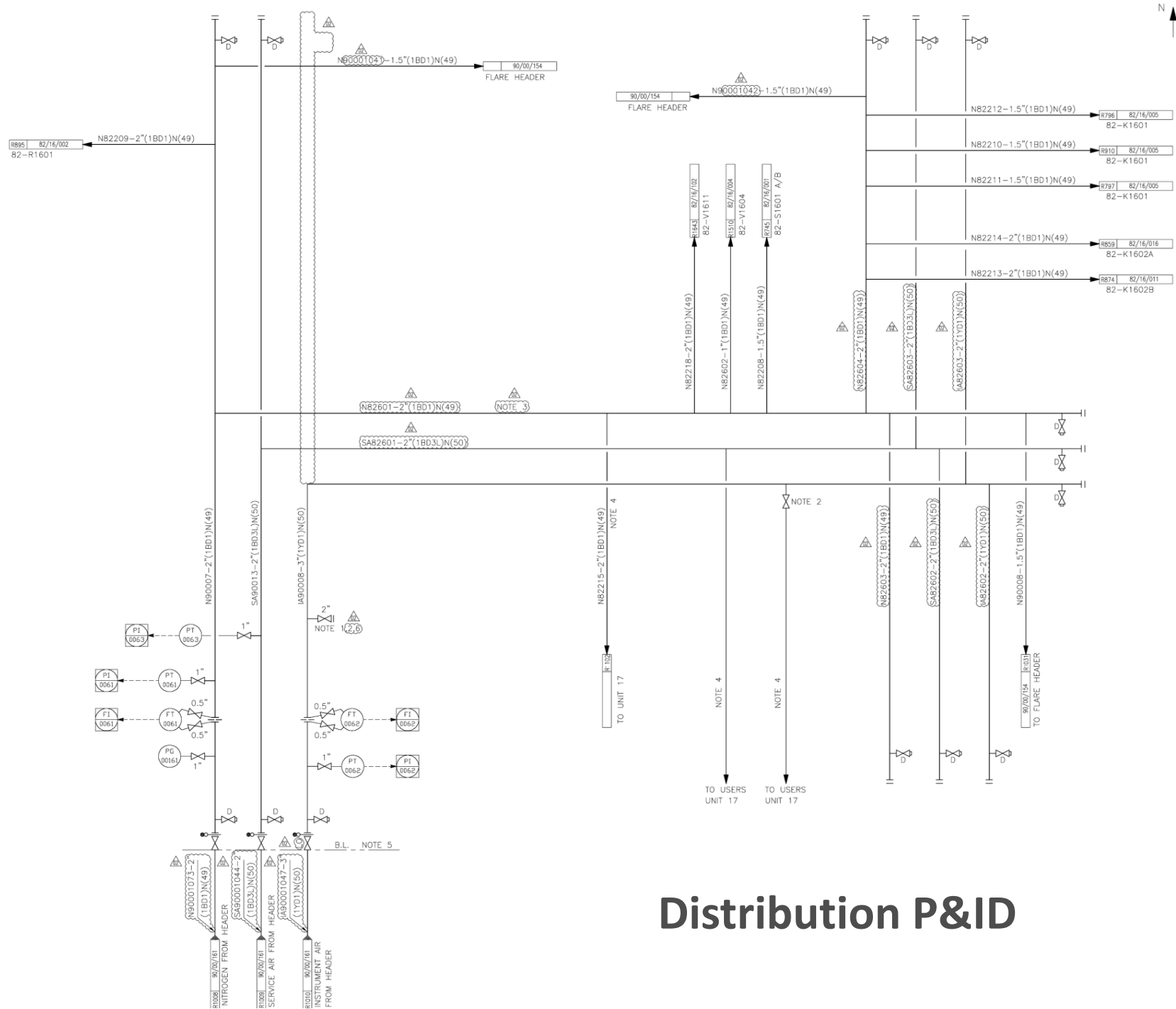


Interconnecting P&ID

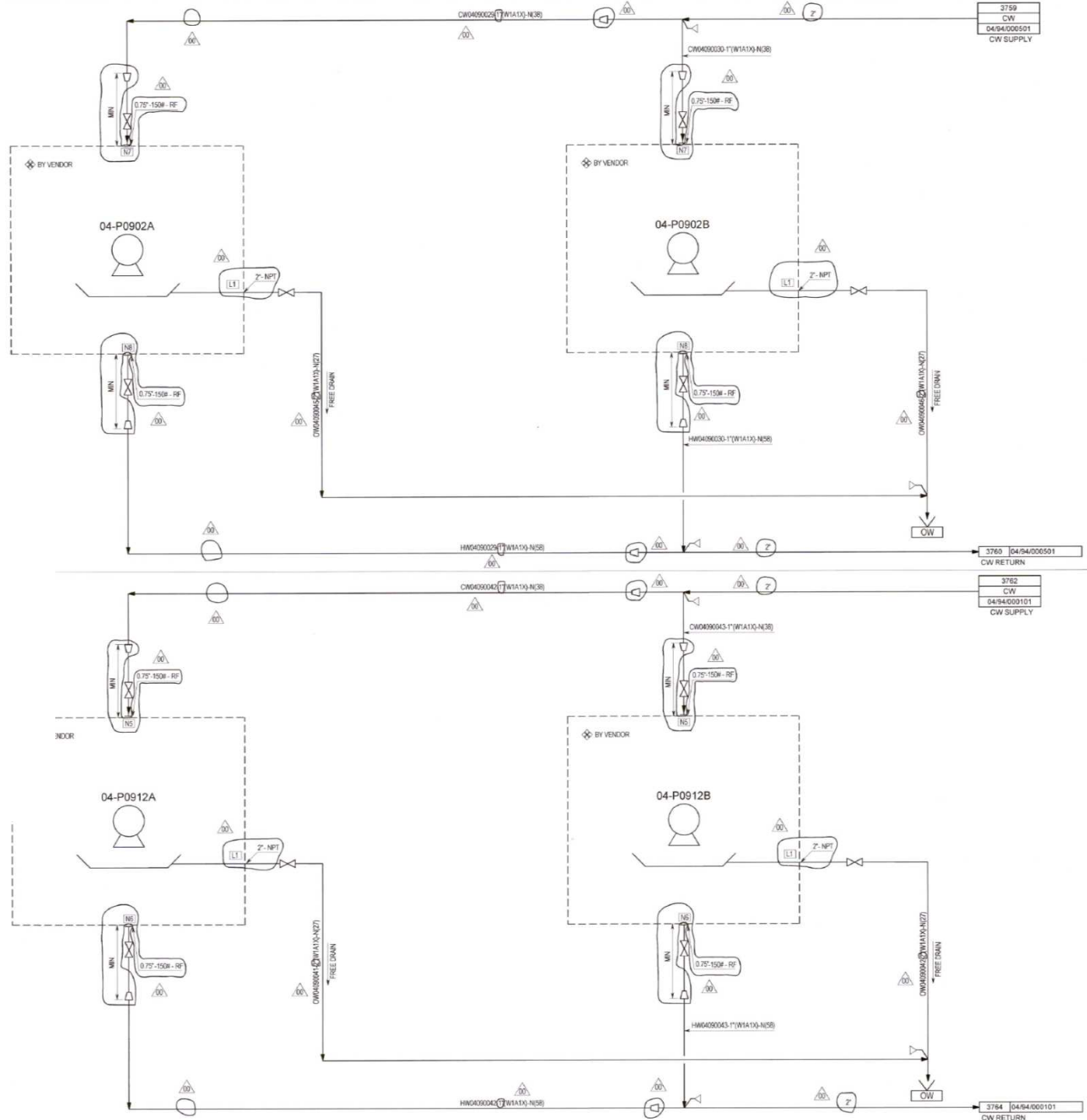
Piping & Instrumentation Diagram



What type of P&ID is this?



Distribution P&ID

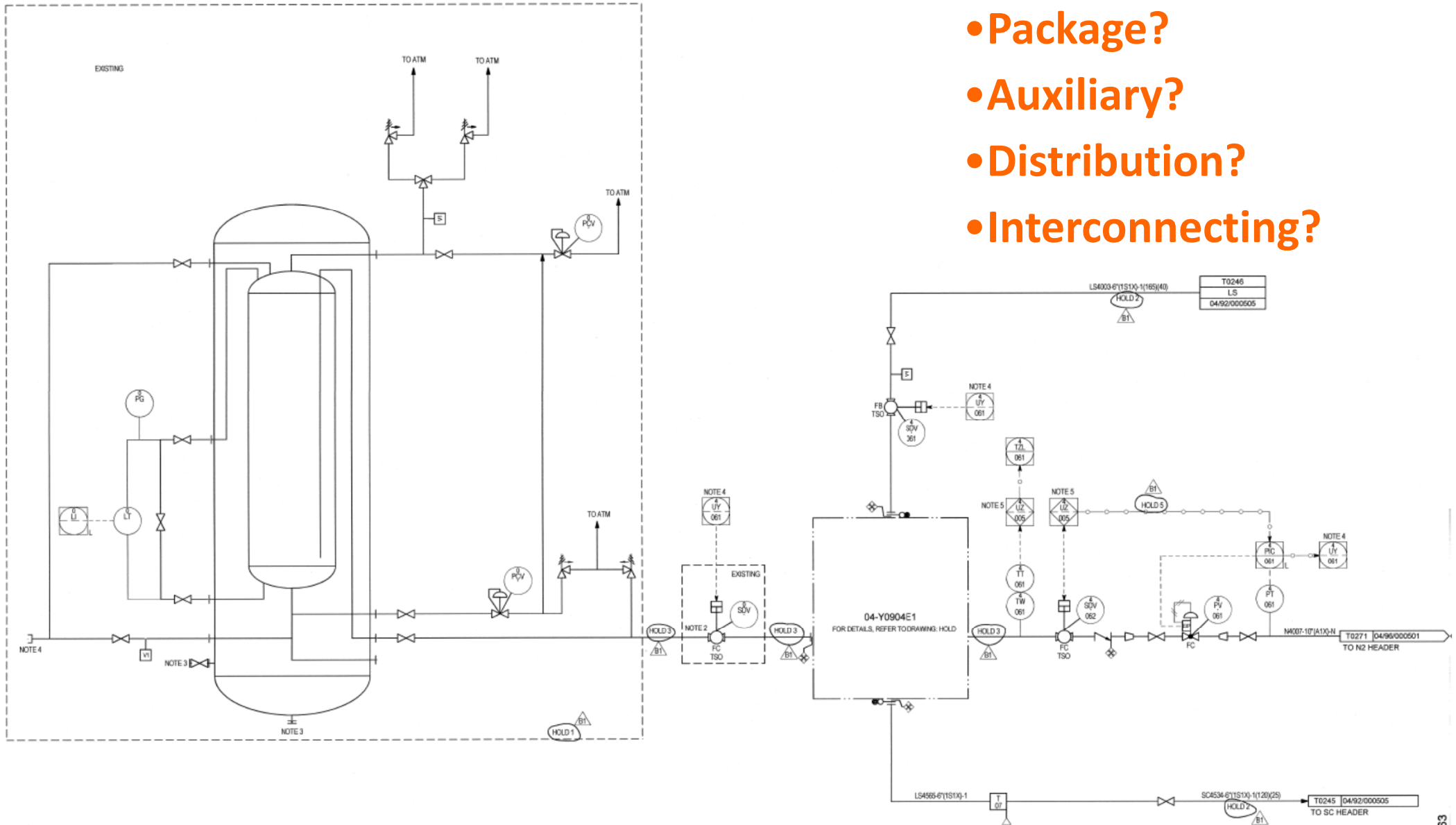


What type of P&ID is this:

- Process/Utility unit?
- Package?
- Auxiliary?
- Distribution?
- Interconnecting?

What type of P&ID is this:

- Process/Utility unit?
- Package?
- Auxiliary?
- Distribution?
- Interconnecting?



■ The Process Diagrams

- The Block Flow Diagram (BFD)
- The Process Flow Diagram (PFD)
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 - The various types of P&IDs
 - **The different revisions of the P&IDs**
- Other Process diagrams
- Quiz

P&IDs are typically issued 3 times, as designed progresses

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IFR

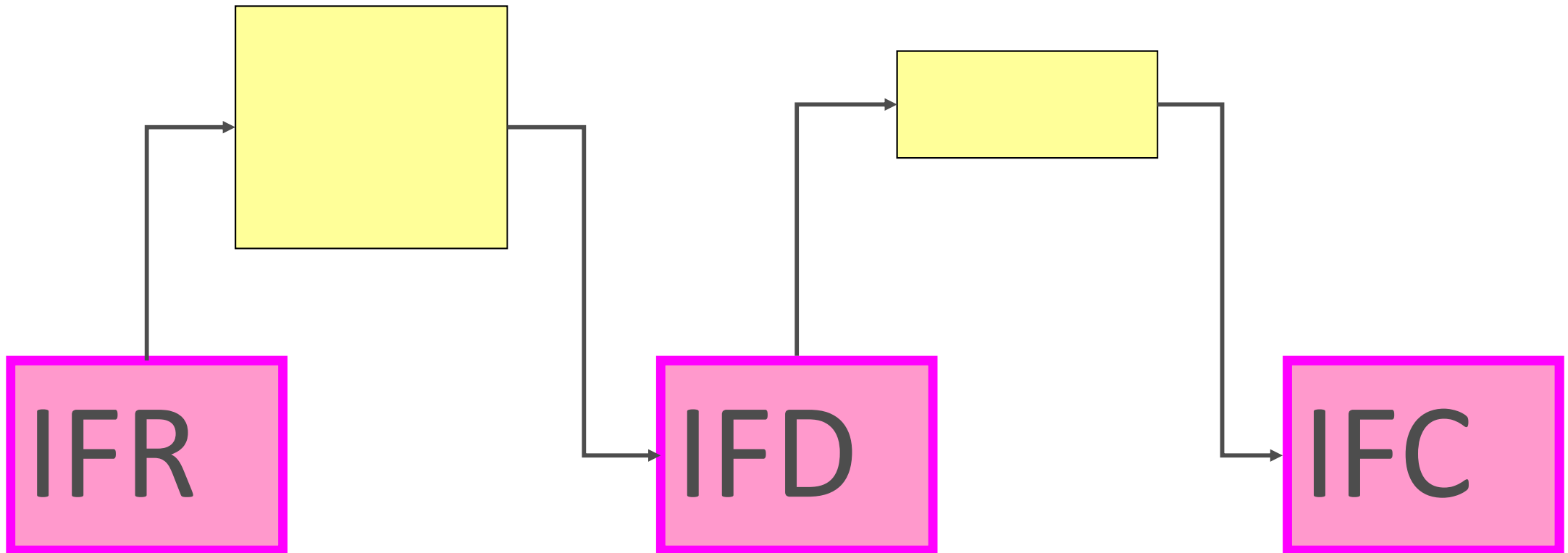


IFD

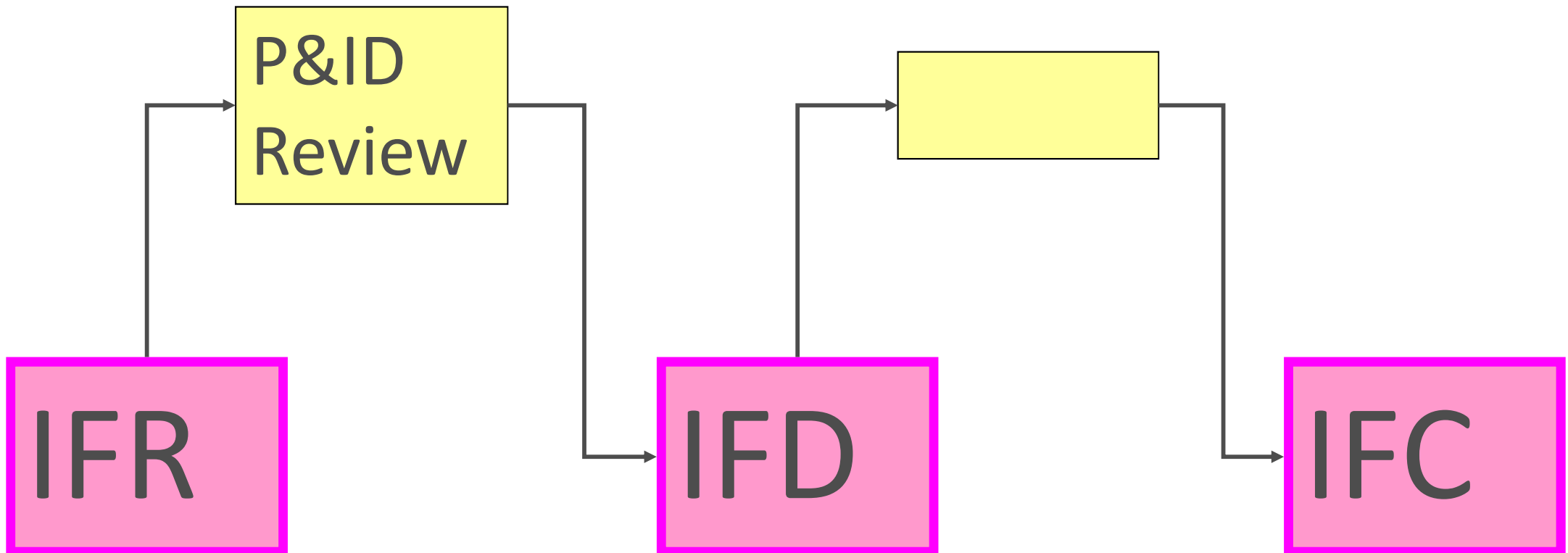


IFC

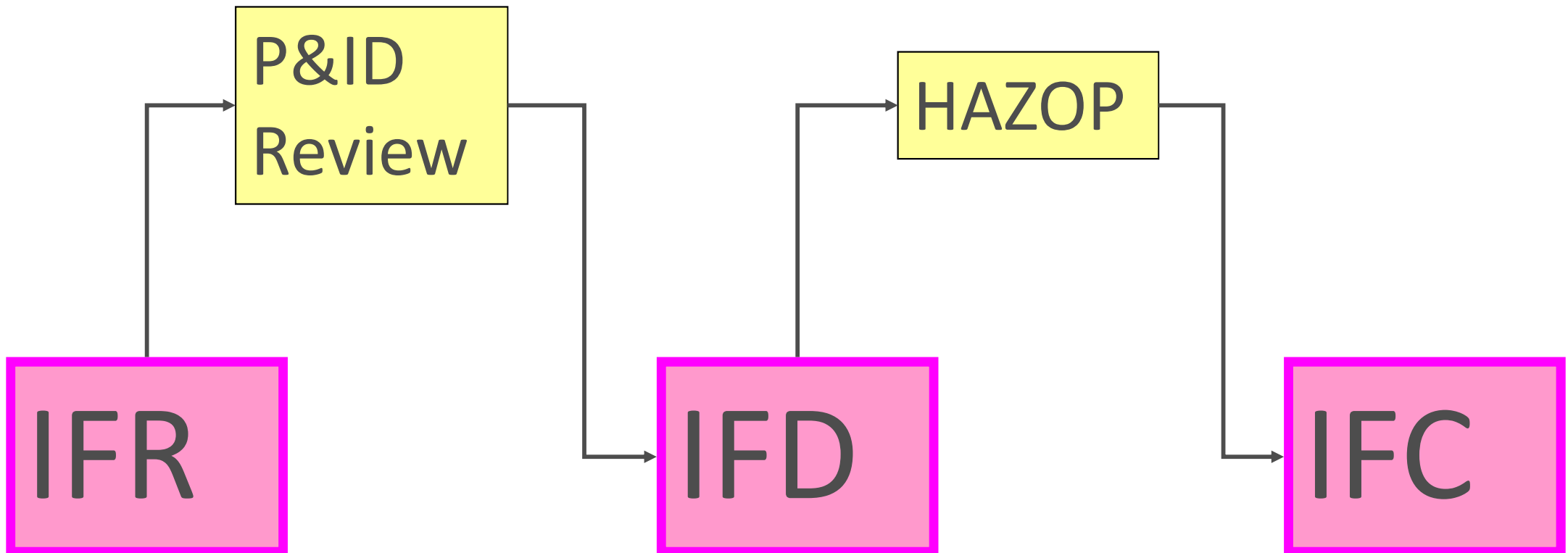
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Which revision of P&IDs has the following purpose/contents?

Purpose	IFR	IFD	IFC
Collect Client comments			
Perform PID review			
Perform HAZOP			
Perform Piping MTO for 1st Piping purchase			
Freeze Control system I/O list			
Issue Piping ISOs			
Contents	IFR	IFD	IFC
Comments from all disciplines			
Comments from Piping, I&C disciplines			
Finalized interfaces with eqt/package			
Exercised Contract Option(s)			
Size, number of PSVs and CVs			
Diameter of process lines			
Diameter of utility lines			
HAZOP comments incorporated			
Client comments incorporated			

Which revision of P&IDs has the following purpose/contents?

Purpose	IFR	IFD	IFC
Collect Client comments	X		
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Size, number of PSVs and CVs			X
Diameter of process lines	X		
Diameter of utility lines		X	
HAZOP comments incorporated			X
Client comments incorporated		X	

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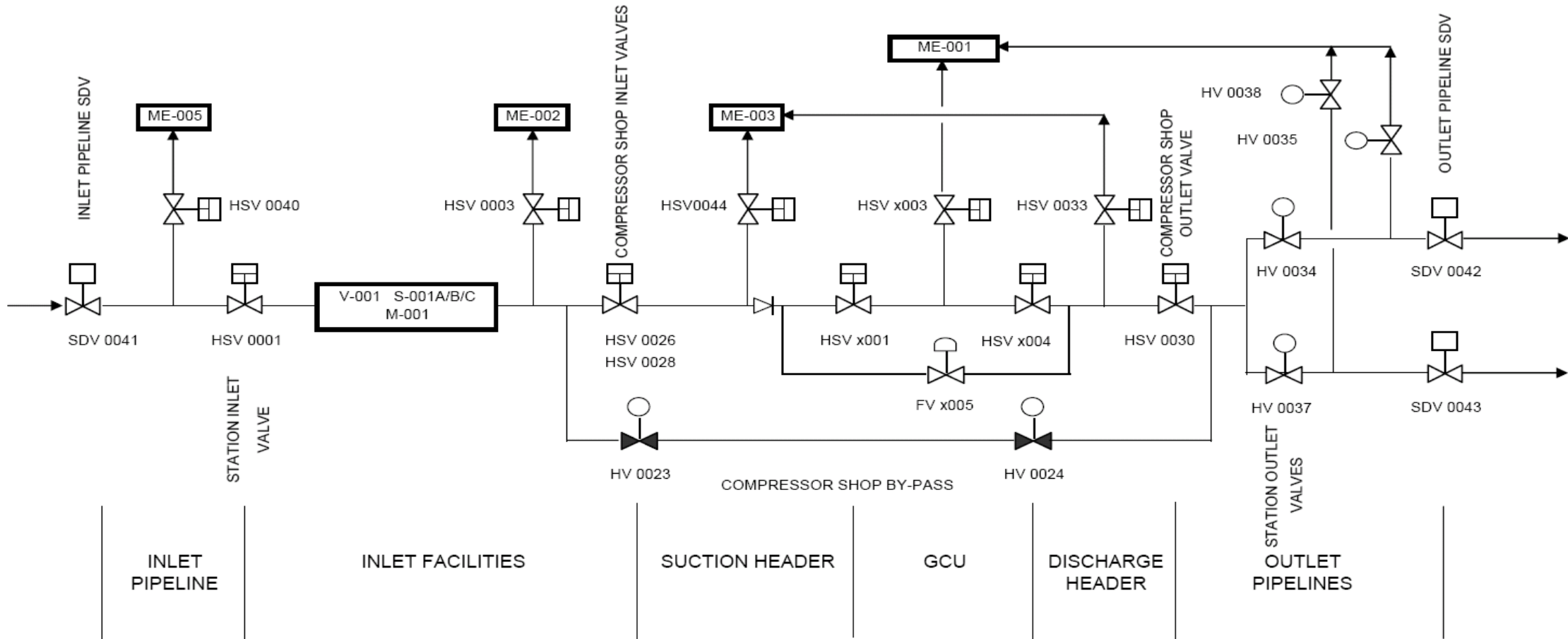
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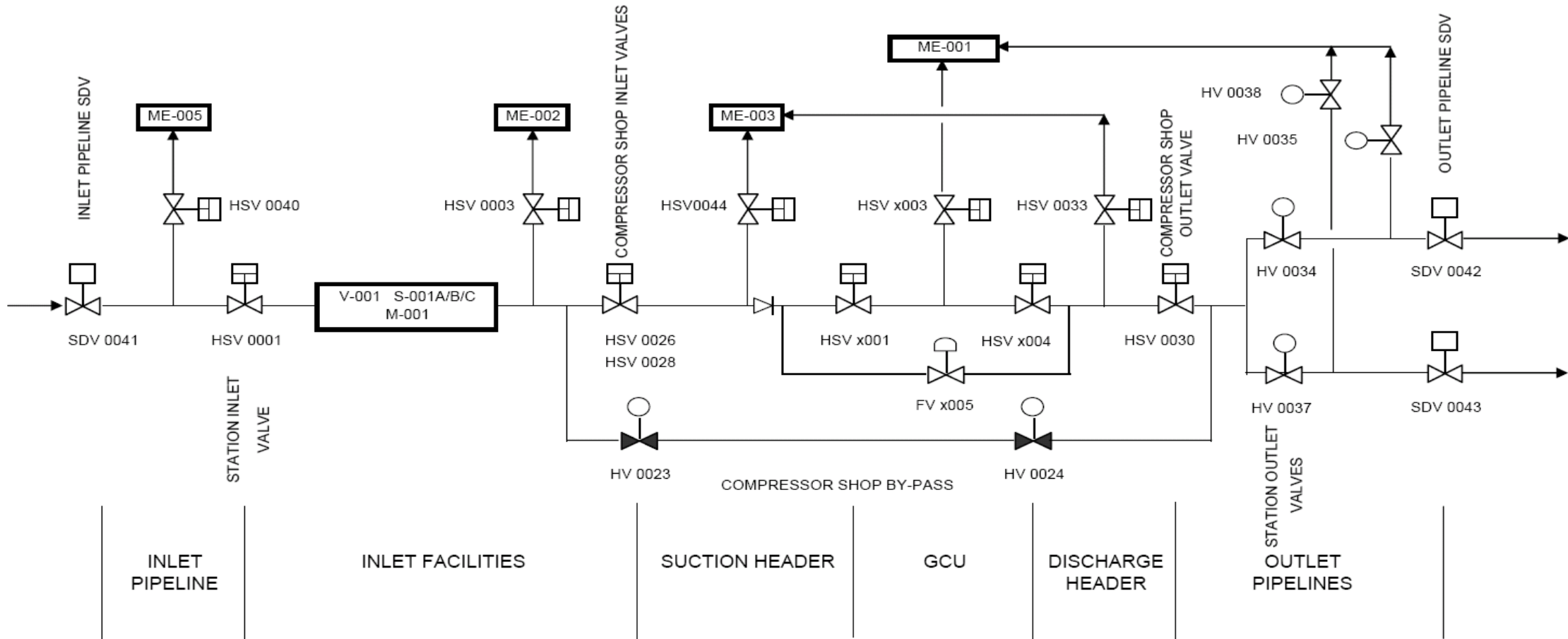
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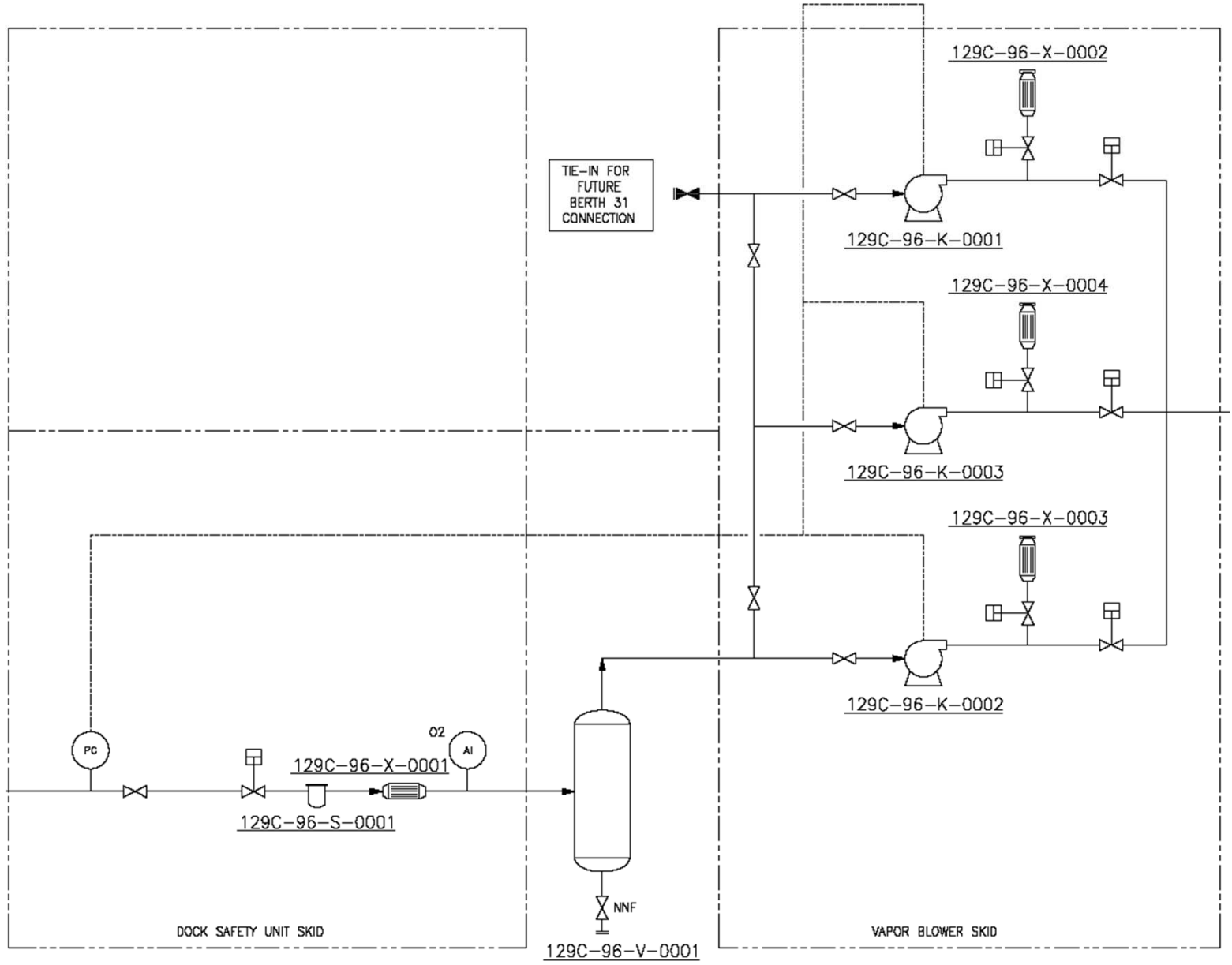


The ESD simplified diagram (or sectionalisation diagram)

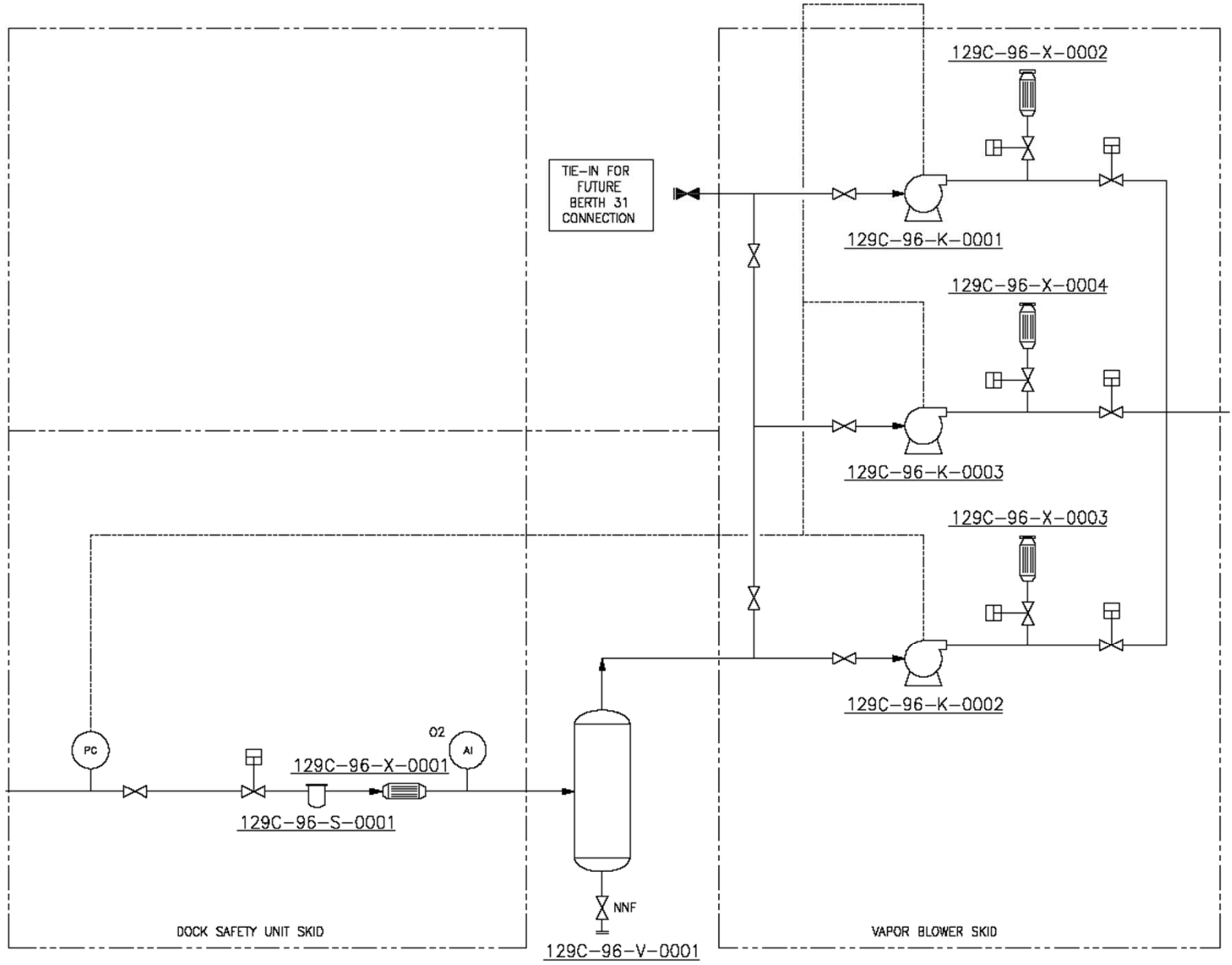
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Which document is this?



Which document is this? **A PFD**



Which process diagram is produced for each operating case?

Which Process Diagram shows the entire Plant?

The indication “NNF” (Normally Non Flowing) is shown on which Process Diagram?

Which Process Diagram shows a Process (or utility) unit?

Which process diagram is produced for each operating case?

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Whose legend sheet is this?

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LS	: LOW PRESSURE STEAM																																																																																																																																		
MS	: MEDIUM PRESSURE STEAM																																																																																																																																		
N	: NITROGEN																																																																																																																																		
RV	: WET GAS FLARE																																																																																																																																		
RW	: RAW WATER																																																																																																																																		
SA	: SERVICE AIR																																																																																																																																		
SC	: STEAM CONDENSATE																																																																																																																																		
SF	: SOUR GAS FLARE																																																																																																																																		
SR	: SEA WATER RETURN																																																																																																																																		
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SU	: SOUR CONDENSATE																																																																																																																																		
SW	: SERVICE WATER																																																																																																																																		
WB	: WET LIQUID BLOWDOWN																																																																																																																																		
ASC	: ANTI-SURGE CONTROLLER																																																																																																																																		
A	: ANALYSER																																																																																																																																		
CC	: CORROSION COUPON																																																																																																																																		
CP	: CORROSION PROBE																																																																																																																																		
FC	: FLOW CONTROLLER																																																																																																																																		
FI	: FLOW INDICATOR																																																																																																																																		
FQI	: FLOW TOTALIZER																																																																																																																																		
LC	: LEVEL CONTROLLER																																																																																																																																		
LI	: LEVEL INDICATOR																																																																																																																																		
PC	: PRESSURE CONTROLLER																																																																																																																																		
PI	: PRESSURE INDICATOR																																																																																																																																		
TC	: TEMPERATURE CONTROLLER																																																																																																																																		
TI	: TEMPERATURE INDICATOR																																																																																																																																		
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<p><u>FOR UPSTREAM UNITS</u></p> <table border="1"> <tbody> <tr><td>A</td><td>: AIR COOLER</td></tr> <tr><td>D</td><td>: DRUM</td></tr> <tr><td>H</td><td>: HEATER</td></tr> </tbody> </table>	A	: AIR COOLER	D	: DRUM	H	: HEATER		<p>PIPING AND INSTRUMENT SYMBOLS</p> <table border="1"> <tbody> <tr><td>⌞</td><td>CONTROL VALVE</td></tr> <tr><td>⌘</td><td>MANUAL VALVE</td></tr> </tbody> </table>	⌞	CONTROL VALVE	⌘	MANUAL VALVE	<p>ABBREVIATIONS</p> <table border="1"> <tbody> <tr><td>NC</td><td>: NORMALLY CLOSED</td></tr> <tr><td>NO</td><td>: NORMALLY OPEN</td></tr> <tr><td>NNF</td><td>: NORMALLY NO FLOW</td></tr> </tbody> </table>	NC	: NORMALLY CLOSED	NO	: NORMALLY OPEN	NNF	: NORMALLY NO FLOW																																																																																																																
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That of PFDs, as, among other things, no line designation, no other instruments than controllers

You just arrived at a new facility. What document will you ask to see first to get an overall view of the Plant Process?



You just arrived at a new facility. What document will you ask to see first to get an overall view of the Plant Process? **The Block Flow Diagram**



You enjoyed this presentation?

Share my experience on other topics:

- Engineering
- Contract Management
- Project Control

Attend my **classroom training**

The list and schedule of coming sessions is on my blog at:

<http://www.toblog.fr/en/baron.html>

The screenshot shows a blog post on a website. The background is a 3D architectural rendering of an industrial facility with yellow and grey structures. The word 'blog' is in the top left. In the top right, there are flags for France and the UK. The main content area has a grey header with the title 'Coming Engineering Management Training session' and the date 'Published Thursday 14/03/2013'. Below the header is a photo of a man in a grey shirt and dark pants running on a green lawn in front of a large, light-colored building. To the right of the photo is the text: 'I would like to invite you to share my 20 years Engineering experience with EPC contractors including Technip and Saipem: Attend the next session of my highly INTERACTIVE Engineering Management Training. Dates: May 14th-16th, 2013 Venue: Rueil Malmaison (green and historical city outside Paris), France'. To the right of this text is a 'Powered by' logo for 'Editions TECHNIP'. Below the logo is a small portrait of a man and a text box containing a bio: 'Baron Hervé He began his professional career with an international oil company. Starting out with an interest in the Operation of Oil & Gas Facilities, his technical curiosity about their design saw him move to engineering contractors to become expert in this area'.